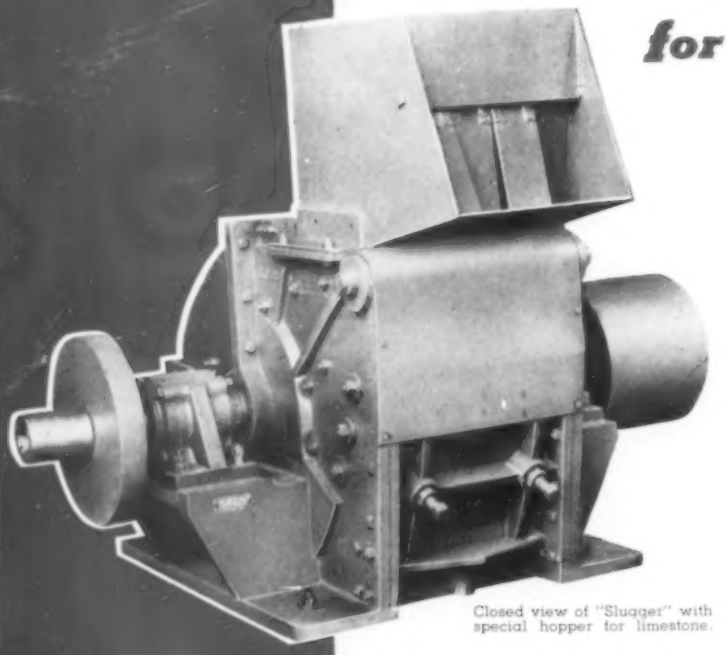
THE WILLIAMS "SLUGGER"

Crusher and Pulverizer

for AGRICULTURAL LIMESTONE



Closed view of "Slugger" with special hopper for limestone.

You can now crush large pieces of stone weighing from 75 to 100 pounds to agricultural limestone in One Operation with the Williams "Slugger". This not only eliminates sledging, but also does away with the unnecessary expense of a primary crusher.

The "Slugger" represents the most advanced type of crushing equipment on the market today and with seven sizes to choose from producing from 4 to 30 tons per hour, every producer whether large or small can now afford to install a Williams.

Also Crushes "One Man" Size Stone to 1¼" or ¾" in One Operation

By also reducing large rock to 1¼" or ¾" in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Open view of "Slugger" showing heavy duty hammers, liners and discs.

SEVEN SIZES

30 TO 150 HORSEPOWER

The Williams Patent Crusher & Pulverizer Co.
800 ST. LOUIS AVE. ST. LOUIS, MO.

SALES AGENCIES IN ALL PRINCIPAL CITIES INCLUDING

Chicago	NEW YORK	Oakland, Calif.
37 W. Van Buren St.	15 Park Row	1629 Telegraph Ave.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

Williams

PATENT CRUSHERS GRINDERS SHREDDERS

NEXT MONTH'S ISSUE

A new lime plant is described in detail. Methods of a cement company which mines its limestone, using equipment developed for the coal industry. Two stories will describe recently completed sand and gravel plants; one written around the new sand preparation equipment and methods, and the other gives details of a large blending and storage plant designed to meet any specification for sand and gravel. Nettleton's series on stone crushing and specifications, and Shaw's on sand classification are continued, together with the Chemist's Corner, Hints and Helps for Superintendents, and Lime Forum departments so popular with the readers.

Sand Preparation

A large eastern sand and gravel company has installed a new 50-ton per hour plant which blends four classified fractions to strict asphalt sand specifications. The large demand for fine sand should make this article of timely interest to other operators who may be faced with a similar problem.

Limestone Mining

Changes and improvements made in the limestone mining operations of a cement company have resulted in a marked reduction in costs. Machinery and methods used in mining coal on a large scale have been adapted to the economical removal of limestone.

Blending Sand and Gravel

With specifications becoming more rigid, the need for ample storage capacity for various sizes and facilities for accurate blending have become more pressing. A new 2000-cu. yd. per day plant was recently completed by a large Middle West company which has been particularly noteworthy for its progressive methods.

Modern Lime Plant

One of the newest and perhaps most modern shaft lime kiln installations. Some features of the design and the equipment have been used for the first time in this new plant.

Concrete Products

Production methods of concrete tile manufacture in England which are now being introduced in this country will be the subject of one profusely illustrated article. A large cast stone manufacturer has found that diversification pays. He now makes concrete floor joists, floor slabs, burial vaults, roof slabs, garden furniture, mosaic cast stone, and building blocks. This article should be of general interest. Another article will describe the success of a western ready-mixed concrete operator.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 42, No. 9

Contents for September, 1939

Departments

ROCK PRODUCTS is owned and published by the Tradepress Publishing Corporation. Publication offices, 205 West Wacker Drive, Chicago, Ill., Telephone—Central 0670.

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INDEXED in the Industrial Arts Index Published Monthly. Subscription Price: United States and Possessions, Mexico, Cuba, Canada, $2.00; and $4.00 to foreign countries. Twenty-five cents for single copies.

TO SUBSCRIBERS—Date on envelope indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

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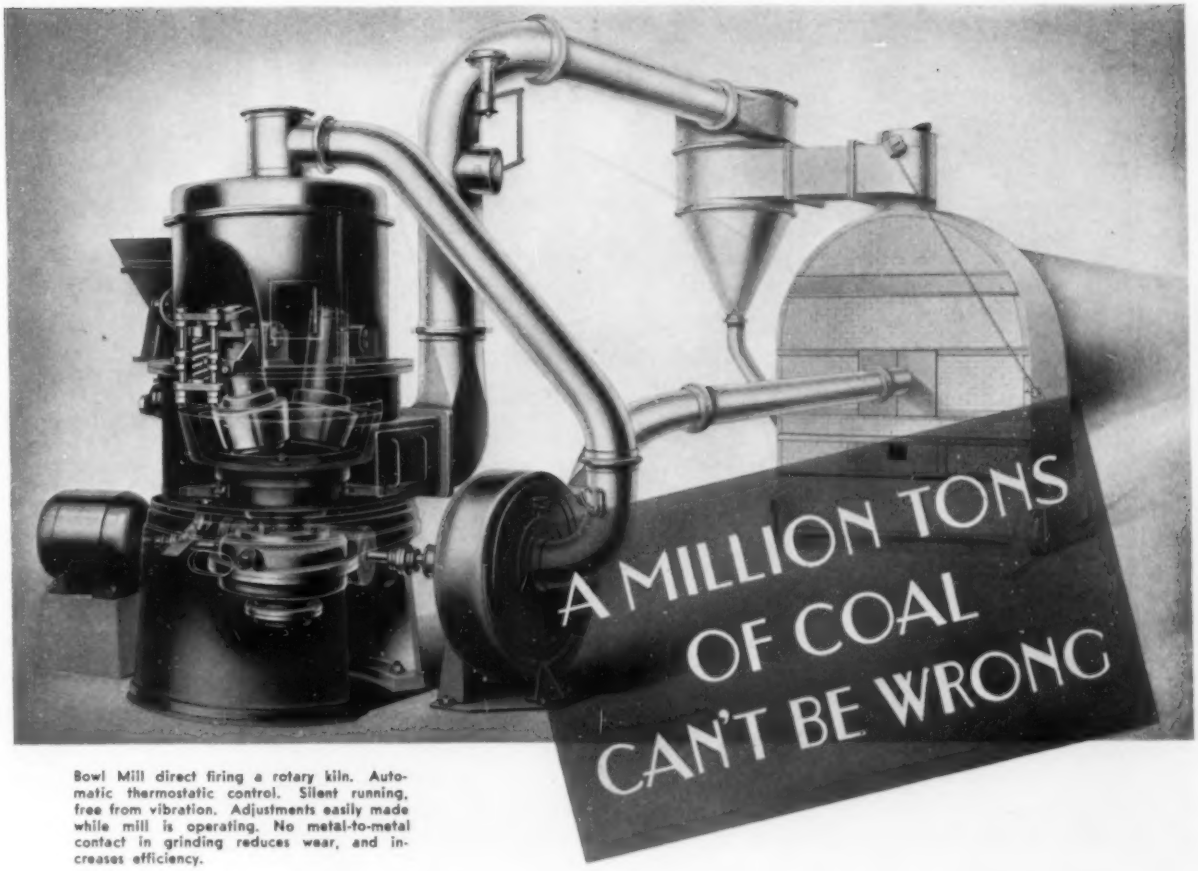
Impartial measurement of reader interest in terms of paid circulation.

Authentic facts relating to editorial scope and readership analysis.

ABP

(PUBLISHED MONTHLY)

Entered as second-class matter, Jan. 30, 1936 at the Chicago, Ill., postoffice under the Act of March 3, 1879.



Bowl Mill direct firing a rotary kiln. Automatic thermostatic control. Silent running, free from vibration. Adjustments easily made while mill is operating. No metal-to-metal contact in grinding reduces wear, and increases efficiency.

WE made a careful survey of seven rotary kiln plants, employing a total of twenty-four Raymond Bowl Mills, and obtained authenticated figures from the operating engineers, which showed:—

That these 24 direct firing units have pulverized over a million tons of Pennsylvania and West Virginia coal to an average fineness of 83 per cent passing a 200-mesh screen and that the overall power consumed has averaged 17.3 kilowatt hours per ton, while the cost of repair parts was less than one cent per ton of coal pulverized.

It is this performance, maintained in actual service, that enables Bowl Mill users to reduce their operating costs far below former levels. Every rotary kiln operator should inquire into the economies of the Bowl Mill.

BOWL MILL

See the Bowl Mill operating before you decide on direct-firing. Ask for list of installations nearest you.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
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MILEAGE INCREASED 80%

Typical tractor-trailer unit and drivers of Hale-Halsell Co. This 40-vehicle fleet is now 100% Texaco fueled and lubricated as the result of a year's test.

"AS THE RESULT of a year's testing of various universal joint and wheel bearing greases, we learned that Texaco Marfak would not only deliver service equal to any of the greases tested, but would stand up approximately twice as long. In brief, instead of having to repack wheels each 10,000 miles, we now get around 18,000 miles with Marfak."—Hale-Halsell Co., McAlester, Okla. This forty tractor-trailer operator also eliminated sludge in his engines, by switching over to Texaco Motor Oil.

Trouble in transmissions and differentials was likewise left behind, by going over to Texaco Thuban.

Experienced automotive engineers, trained in the selection and application of Texaco automotive lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries phone the nearest of our 2279 warehouses in the U.S., or write to The Texas Company, 135 E. 42nd St., N. Y. C., N. Y.

Heavy duty trucks and tractor-trailers of an organization that tested various kinds of lubricants. Result—now Texaco users 100%.

Gasoline Bill Reduced $700.00

This past year, these 40 vehicles traveled some 738,561 miles. During this period, the improved mileage from using Texaco *Fire-Chief* Gasoline provided a saving of more than $700.

TEXACO MARFAK

ANOTHER MILLION-TONNER

that never required a single take-up!

HERE is a typical example of the low cost-per-ton, trouble-free service that results from having your elevator belts specified by the G.T.M.—Goodyear Technical Man.

On his recommendation the belt here pictured, a 12-ply Goodyear Style RC, was installed in the Bellevue, Ohio, plant of The France Stone Company early in 1931.

Equipped with 120 steel buckets having a capacity of 150 tons per hour, this belt performed for seven years *without requiring a single repair or take-up*—with an estimated tonnage of more than 1,000,000 tons to its credit at the time of its removal in 1938.

Under water two months!

But that isn't the whole story. During a flood it was under water for two months, yet when the water receded it showed no ill effects from its long immersion—striking proof of the value of Goodyear's exclusive mildew-inhibiting construction.

This is the kind of economical service the G. T. M. offers you on all elevator, conveyor and transmission belts—and hose, too. To bring him to your plant, write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Goods Distributor.

THE GREATEST NAME IN RUBBER

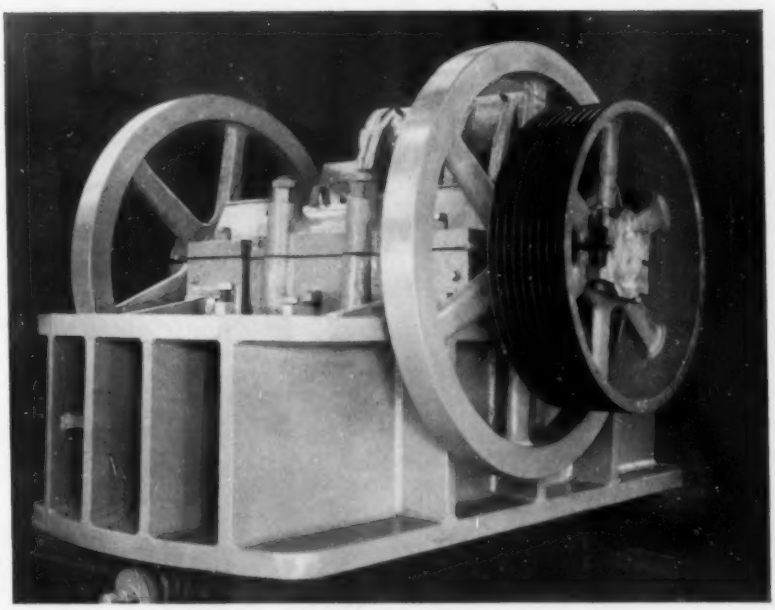
GOODYEAR

Centennial of Charles Goodyear's discovery of vulcanization

TRAYLOR

TYPE H BLAKE JAW CRUSHER

best bet for small or medium plants!



WE BUILD

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Rotary Coolers
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Tube Mills
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Feeders
Rotary Screens
Elevators
Welded or Riveted Stacks, Tanks and Bins for any purpose.

It is a far cry back to when Eli Whitney Blake invented the first practical and successful mechanical rock breaker, but it is a fact that the jaw crusher now bearing his name is still the best in principle.

The new Traylor Type H Blake Jaw Crusher retains all of the desirable features of the Blake machine, but otherwise is as modern as tomorrow.

Consider the Frame, for instance. The heavy cast iron frame is replaced by a full-welded, strongly reinforced steel frame considerably lighter and many times as strong, with the eccentric shaft bearings removable instead of integral.

The Swing Jaw Shaft Suspension is of a design that keeps this shaft in correct alignment permanently. The Jaw swings on the shaft and is well lubricated, and fitted with renewable bushings.

The salient feature of the Traylor Type H Jaw Crusher is its fittings of manganese steel Patented (U.S. Pat. 1,837,102) Curved Jaw Plates, the same principle as the Traylor Original, Patented, Non-Chokable Bell Heads and Curved Concaves for gyratory crushers.

These curved jaw plates effect greater capacity to smaller size product without increase in power used. For example, an old style Blake with flat jaw plates, using 75 H.P. will crush no finer than 3" and has a maximum capacity of about 50 tons hourly. The same size machine in a Type H will produce considerably over 100 tons per hour to 3", or more than 60 tons to 1¾" (finest setting)—and 75 H.P. does the job!

The Type H Crusher is available in sizes 10" x 16" to 24" x 36" and is fully described in Bulletin 1105. Send for a copy, today!

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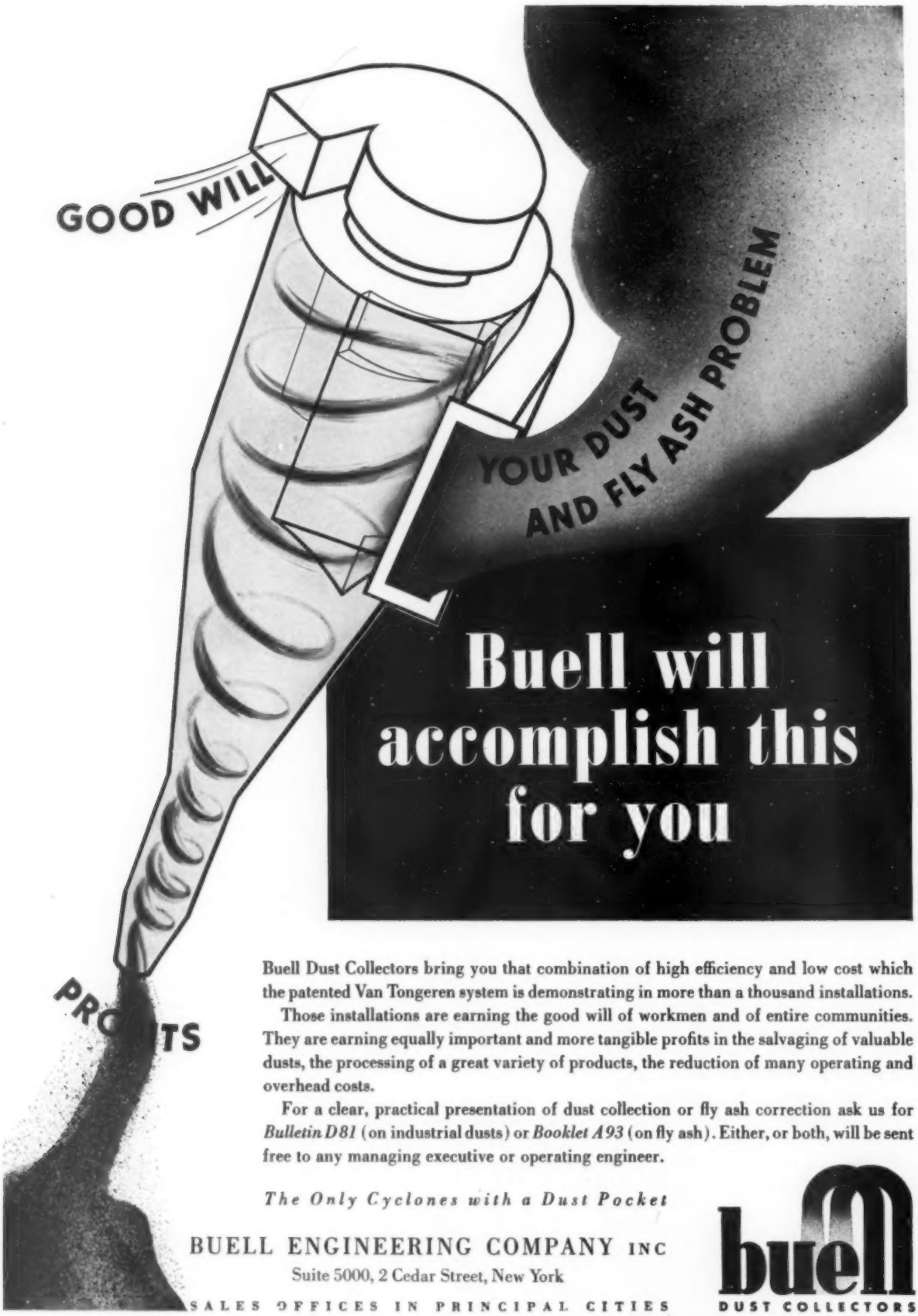

Buell will accomplish this for you

Buell Dust Collectors bring you that combination of high efficiency and low cost which the patented Van Tongeren system is demonstrating in more than a thousand installations.

Those installations are earning the good will of workmen and of entire communities. They are earning equally important and more tangible profits in the salvaging of valuable dusts, the processing of a great variety of products, the reduction of many operating and overhead costs.

For a clear, practical presentation of dust collection or fly ash correction ask us for *Bulletin D81* (on industrial dusts) or *Booklet A93* (on fly ash). Either, or both, will be sent free to any managing executive or operating engineer.

The Only Cyclones with a Dust Pocket

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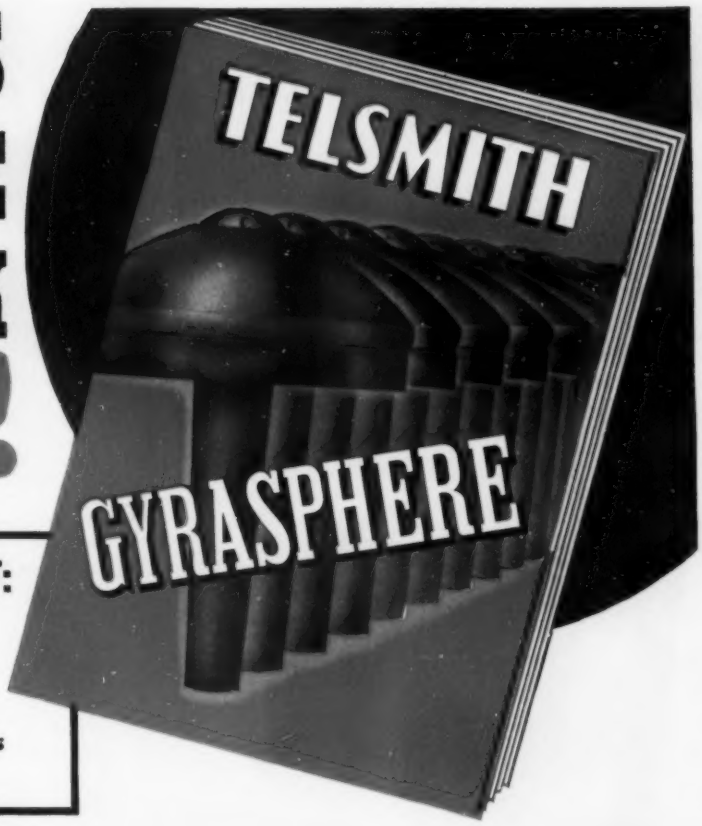
DUST COLLECTORS

GET THIS VALUABLE NEW BOOK FREE!



IT TELLS YOU HOW TO GET:

- a wider range of sizes
- finer crushing
- increased tonnage
- more cubical aggregate
- fewer oversize slabs and splinters
- lower power and upkeep costs

● THIS BOOK is written for the man who wants *the real dope* on secondary crushing—the man who has to have the cold facts before he lays down the cold cash.

This is the book that tells you *why* and *how!*

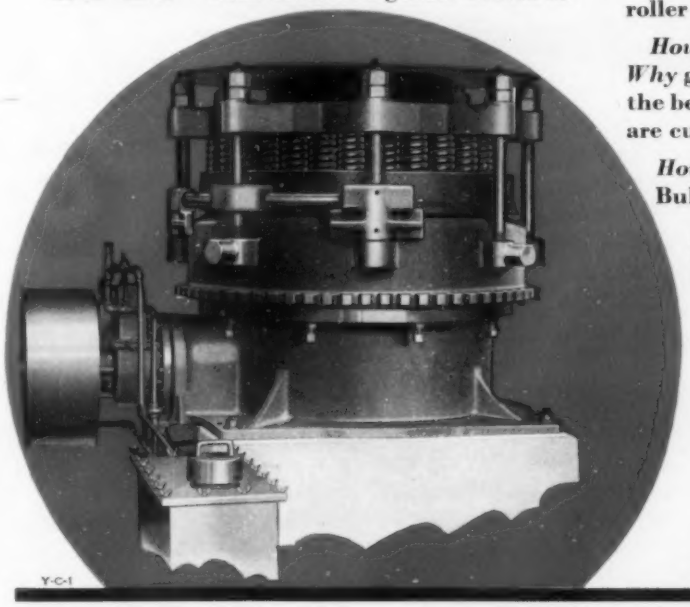
How to get the sizes you want—⅜" to 1½", or ⅛" to ⅜"—with interchangeable coarse or fine crushing concaves. *Why* the Gyrasphere can *and does* take an unregulated and unlimited choke feed.

How two forces combine to produce *the most effective breaking action ever developed in any crushing device.*

How spring relief protects against clogging by fines and breakage by tramp iron. *Why* roller thrust bearings prevent misalignment.

How oil leakage is effectively prevented. *Why* grit and water positively cannot get into the bearings. *How* oil and maintenance costs are cut as they were never cut before.

How can you get this book? By asking us for Bulletin Y-11. *Why not* send for it now?



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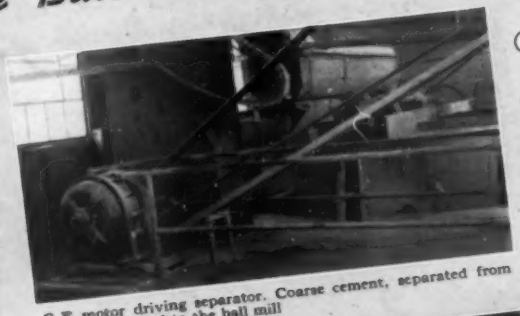
Charleston Trac. & Equip. Corp.
Charleston, W. Va.

MAINTENANCE of *Both*
Less than 3¢ per Hp per Year

Notes on our trip to the Blue Diamond Plant

G-E induction motor driving pump for transferring finished cement



G-E motor driving separator. Coarse cement, separated from fines, is returned to the ball mill

G-E 900-hp, 180-rpm motor driving ball mill

G-E control for sacking house. Note both the magnetic and drum controls

HERE'S another example of how G-E equipment helps to assure continuous, low-cost electrical operation in the production of cement by modern, up-to-date methods. It's the plant of the Blue Diamond Cement Company, Los Angeles, California—G-E equipped throughout, with 1250 horsepower of motors and co-ordinated control to match.

Total electrical maintenance at this plant—for both motors and control—has averaged less than 3 cents per horsepower per year for the ten years that the plant has been in operation. That's *real* dependability, as you will agree—knowing, as you do, the exacting requirements of cement production and the need for equipment that will stand up on heavy-duty jobs 24 hours a day for months at a stretch.

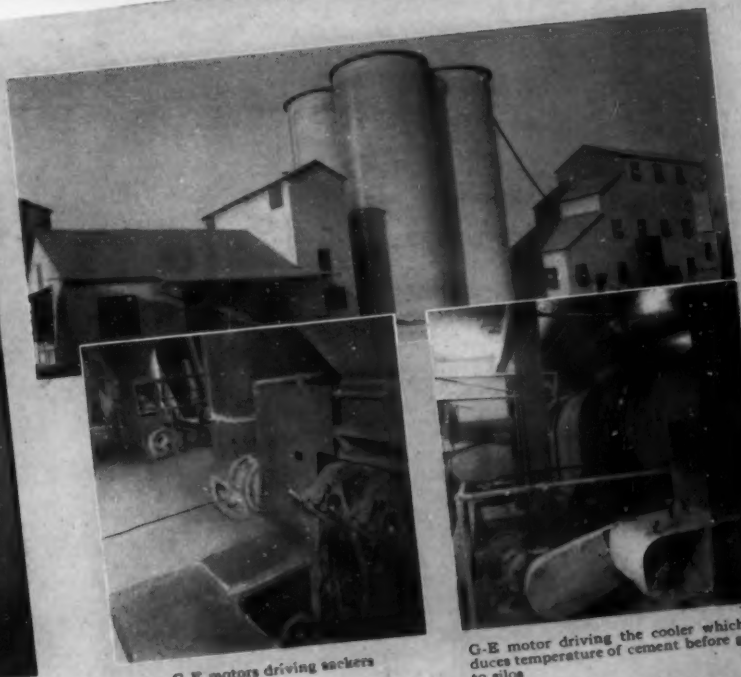
Just as the dependability of G-E equipment and the assistance of G-E application engineers have helped Blue Diamond and many other companies that are producing high-grade cement at low cost, so they can help you to make the most of the opportunity presented by current construction projects. In planning your cost reduction program, remember that our engineers will be glad to help you with the electrical requirements. To enlist their co-operation, just get in touch with our nearest representative. General Electric, Schenectady, N. Y.

MOTORS AND CONTROL

THAT'S WHAT THE TRIP TO BLUE DIAMOND CEMENT COMPANY'S 100% G-E EQUIPPED PLANT SHOWS

General view of the Blue Diamond Cement Company's plant

G-E wound-rotor motor driving cement conveyor that brings cement from silos to sacking house



G-E motors driving sackers

G-E motor driving the cooler which reduces temperature of cement before going to silos

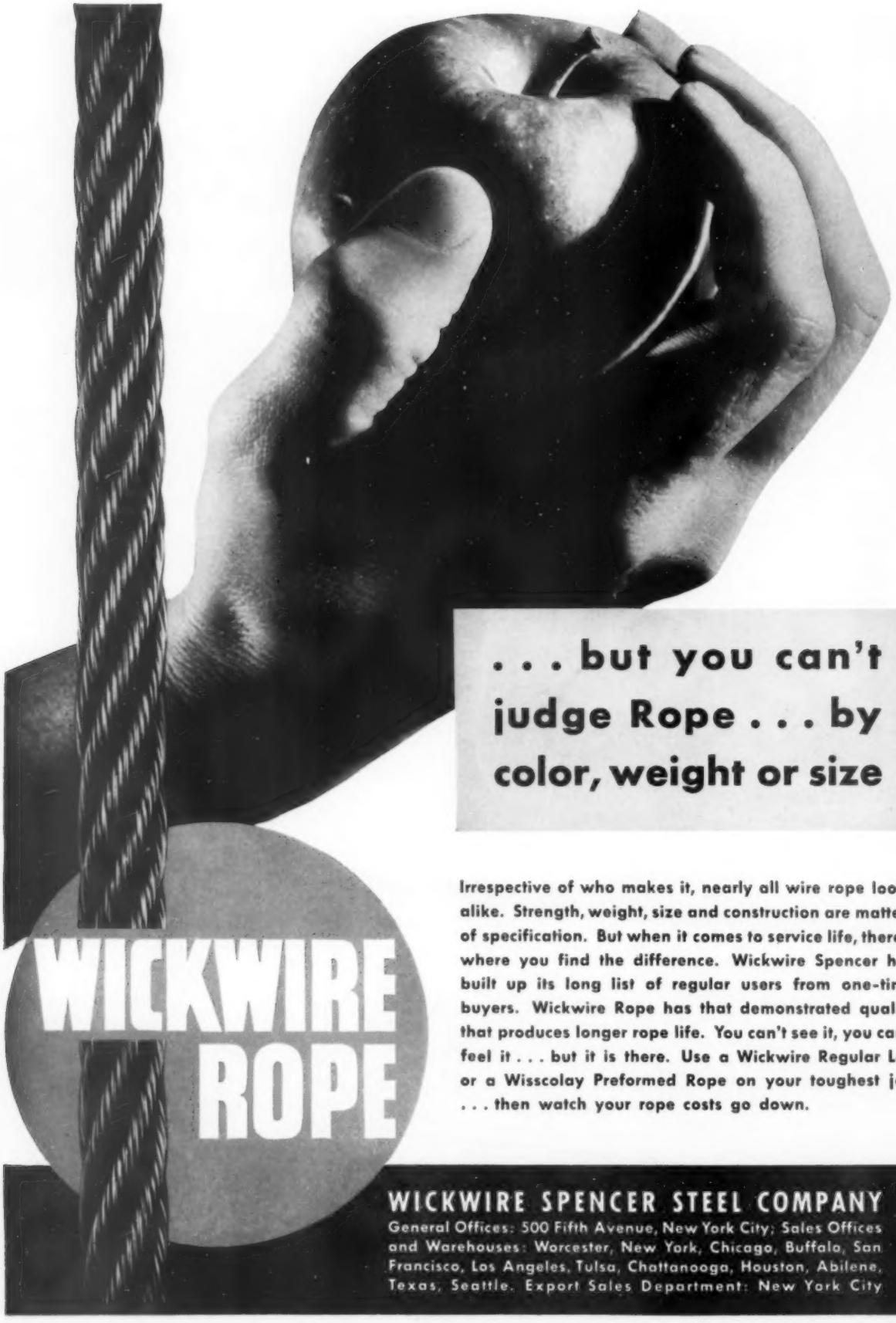
A Statement from W. G. BRADLEY,
Vice-president, BLUE DIAMOND CORPORATION

"Ten years of heavy service have proved the dependability of the General Electric motors and control with which our plant is completely equipped. During this period repair costs on the 1250 horsepower of motors and their controls have been less than $350."

W. G. Bradley, Vice President

GENERAL ELECTRIC

011-520



. . . but you can't judge Rope . . . by color, weight or size

WICKWIRE ROPE

Irrespective of who makes it, nearly all wire rope looks alike. Strength, weight, size and construction are matters of specification. But when it comes to service life, there's where you find the difference. Wickwire Spencer has built up its long list of regular users from one-time buyers. Wickwire Rope has that demonstrated quality that produces longer rope life. You can't see it, you can't feel it . . . but it is there. Use a Wickwire Regular Lay or a Wisscolay Preformed Rope on your toughest job . . . then watch your rope costs go down.

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ALLIS-CHALMERS ANNOUNCES A NEW GYRATORY CRUSHER!

To crush finer..better..easier..at lower cost.

Read This Announcement of a Sensational New Crushing Development! Find Out How Allis-Chalmers' Type "R" Reduction Crusher Can Give You a Better Product . . . Cut Your Operating Costs with an Amazing 6-Way Saving!

Here's news from the world's largest manufacturers of rock and ore reduction machinery . . . important news for you!

Allis-Chalmers announces the Type "R" Reduction Crusher . . . a new development that is taking the fine reduction field by storm! For built into this sensational machine are all the outstanding developments of the 60 year history of gyratory crushers, plus new features that greatly improve crusher performance! And, what's more . . . it's lower in first cost than any comparable machine on the market today!

Check these six features! No other crusher built can offer all of them to you!

NEW IMPROVED MECHANICAL RUBBER SEAL KEEPS bearings efficiently free from dust . . . longer life for your machines!

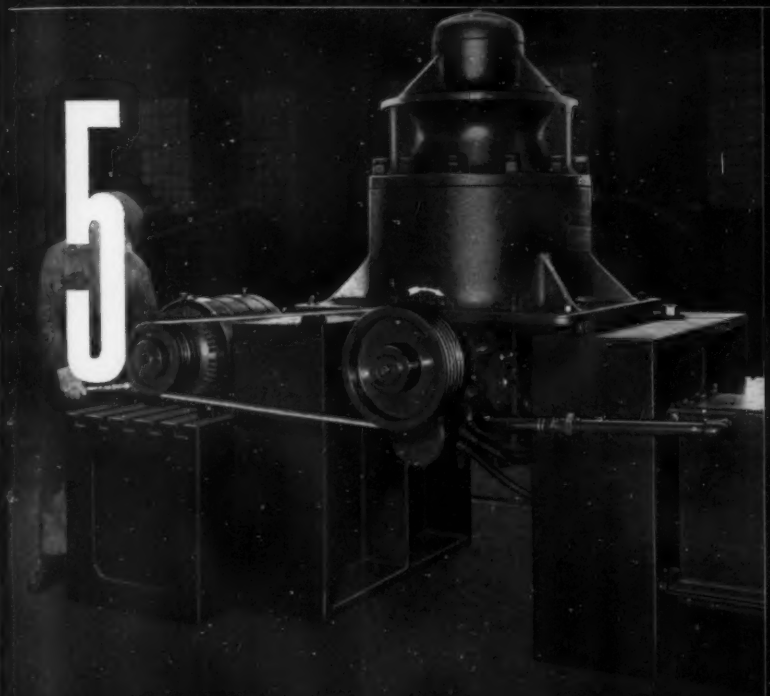
AUTOMATIC RELIEF VALVE PASSES TRAMP iron . . . gives increased safety . . . fewer shut-downs!

3

ONE-PIECE CONCAVE RING PERMITS FINER setting . . . guarantees you a more uniform product. This concave ring is self-tightening!

4

EASY ADJUSTMENT OF DISCHARGE OPENINGS by means of oil-filled hydraulic jack lets you get any size product you desire within range of crusher.



5

FAST, EASY INSTALLATION . . . TYPE "R" Crushers are shipped pre-tested, completely assembled . . . ready to go to work for you immediately when you make oil connections.

6

INCREASED CAPACITY OBTAINED BY PROPER coordination of speed, design of crusher chamber, and head movement.

Type "R" 322 Reduction Crushers are carried in stock to permit quick shipment!

BUT that's only part of the story! For complete information call the Allis-Chalmers District Office near you or write for Bulletin 6006. Find out how the modern new Type "R" Reduction Crusher means larger capacity, less power . . . a better product at lower operating cost for you!

A-11

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

CRUSHING · CEMENT AND MINING DIVISION

ALLIS-CHALMERS

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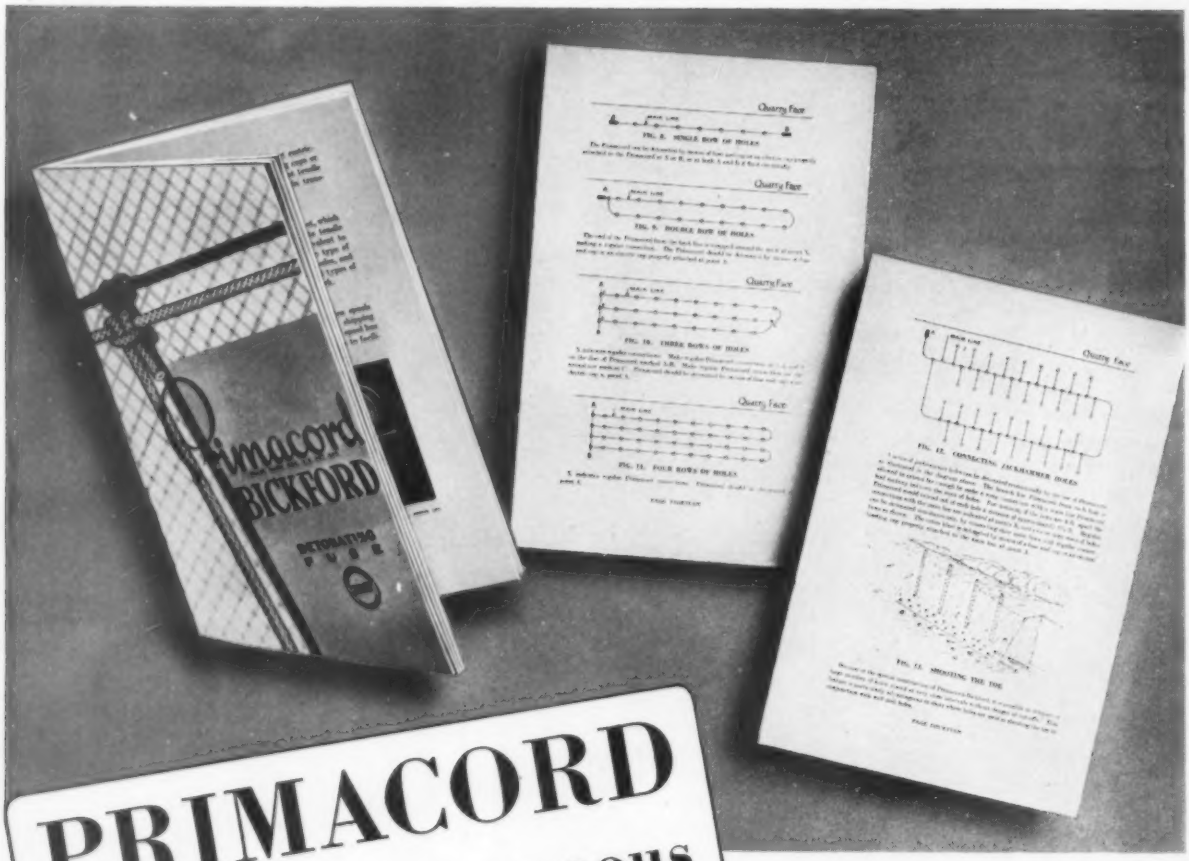

PRIMACORD

. . . the instantaneous detonating fuse for large and small blasts

Makers of Ensign-Bickford Safety Fuse since 1836

Whatever the size or type of blast, Primacord can be used with profit and increased safety. This insensitive fuse acts as the detonating agent in every hole, eliminating the use of caps in each load, and also connects all holes. It is practically instantaneous, yet permits desirable relief of burden. Strong, flexible and light in weight, it is easy to handle and profitable to use.

Write for the useful Primacord-Bickford book.

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PRIMACORD·BICKFORD *Detonating Fuse*

PB 12

"Good Morning... THIS IS WESTINGHOUSE"

Look in the telephone directory in any one of 137 cities, strategically located from Coast to Coast, and you'll find a Westinghouse number that will give you prompt and capable service.

If it's electrical shovel equipment you need, fine. Or, if it's just a minor repair job, you'll get *action* from the minute the Westinghouse operator says "Good morning."

This is just another reason why you should concentrate your electrical purchases with Westinghouse. These well-located offices give you overnight service on almost any requirement . . . and can arrange special action from the factories, when necessary.

For any electrical requirement — call Westinghouse.

MATCHED PERFORMANCE "FROM CATS TO BULL-WHEEL"

Westinghouse electric equipment for power shovels is noted for its ability to stand up under the grinding, grueling wear and tear to which shovels are subjected. Only by matching every element to the job to be done, to give uniform performance from "cats to bull-wheel," can such results be obtained.

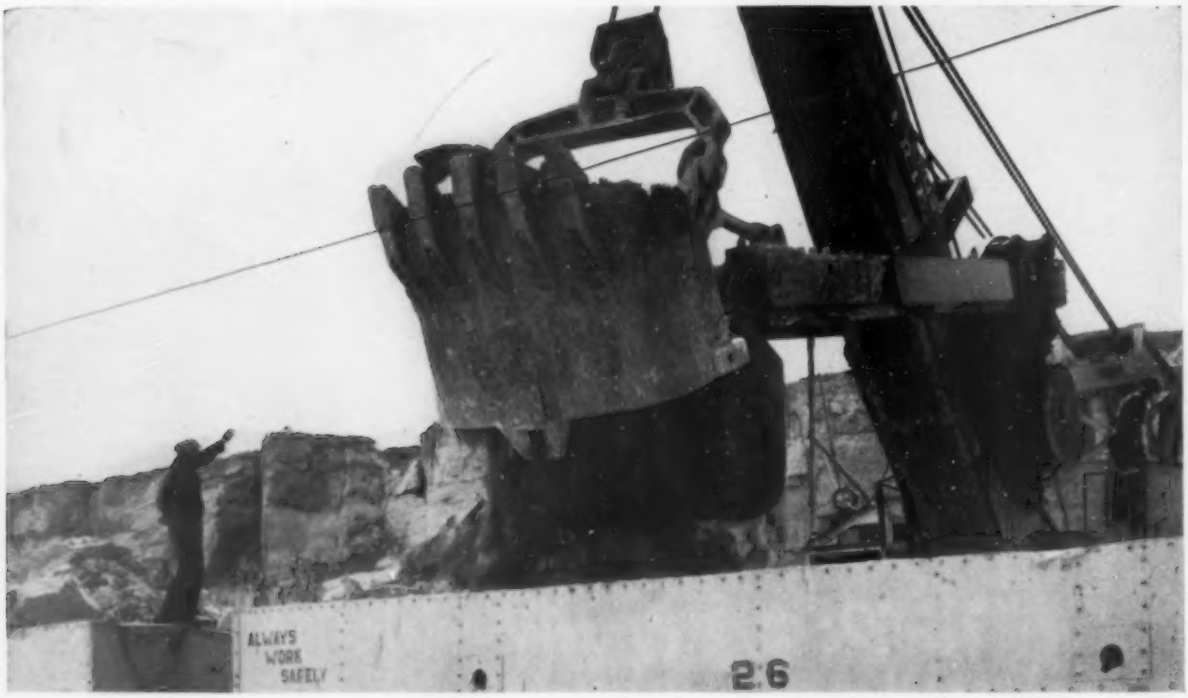
A special booklet on shovel equipment is available on request. Ask our local office for Booklet B-2133, or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Address Dept. 7-N.

J-94076

Westinghouse

ELECTRICAL PARTNER OF THE MINING INDUSTRY

W WESTINGHOUSE ELECTRIC



Steel in Stock for Quick Maintenance and Repair

● Ryerson steels for the Rock Products Industry are helping maintain peak production schedules — avoiding tie-ups and minimizing delay. When something breaks — when construction or extensions are necessary, you can depend on immediate shipment of the exact steel you need from a nearby Ryerson plant. All Ryerson steels are of known, uniform, high quality. Stocks include everything from special abrasion resisting sheets and plates to structurals — from shafting to tool steel and babbitt. When you need steel for any purpose, specify Ryerson Certified. Immediate shipment is assured.

Let us send you the current Ryerson Stock List.

Ryerson Stocks Include:

Beams and Structurals
Channels, Angles
Tees and Zees
Hot Rolled Bars
Hoops and Bands
Rails, Splices, Spikes, Bolts, etc.
Plates—Sheets
Alloy Steels—Tool Steels
Heat Treated Alloy Steel Bars
Stainless Steel
Cold Finished Shafting
Strip Steel, Flat Wire, etc.
Boiler Tubes and Fittings
Welding Rod—Mechanical Tubing
Rivets, Bolts, Nuts, Washers, etc.
Concrete Reinforcing Bars
Babbitt Metal and Solder

RYERSON *Certified* STEELS

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC.
PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, CINCINNATI, DETROIT, CLEVELAND, BUFFALO, BOSTON, PHILADELPHIA, JERSEY CITY

NEW DEAL CAUSES OF UNEMPLOYMENT

New Dealers promised, and to an extent little realized have carried through, a reformation of industry and business. By that is not meant *reformation* in its religious sense but "reëstablishment," a change in form or character, presumed to be an improvement. Their idea was to make industry and business assume directly the cost of supporting all the people. That meant only two things: (1) taking the where-with-all away from business men and producers in the form of taxes, or (2) public ownership and management of industry and business. Since industry and business (including farming) are the sources of all wealth and productive services, it is obvious that they have always supported all the people—many, it is now generally conceded, indirectly and inadequately.

While there probably are now and always have been among the Administration's New Dealers some who have believed in and advocated (privately) public ownership or communism, the ruling element, which may be only the President himself, has stuck chiefly to taxes on and regulation of privately-owned business as the direct method of making industry and business support all the people, whether gainfully employed or not. But in this as in most other New Deal projects there has been little consistency; business men have been taxed not only to support idle millions but in many ways the government has entered into competition with them in a business way.

Government, as conceived by New Dealers, therefore undertook to extract income (wealth) from its actual producers—in business and industry—and redistribute it to better advantage of all concerned. In 1938 it took 22 percent of the national income—the total income of all of us—to so redistribute, and as that was not sufficient it reached into future income and borrowed against that, as it has done every year since 1932. Taking this into account the government took in 1938 and is taking in 1939 about one-fourth of our present and future national income.

By all the standards that have gone before this is vastly too much of our national income for government to take. In the case of 163 representative American corporations taxes paid in 1938 were 61.6 percent of the net earnings (before taxes). Tax payments were twice as much as dividend payments and were equivalent to $576 per employe. One wonders how long the actual producers and rightful claimants of this income will be willing meekly to pay it over to bureaucrats and through them to unemployed, unless these bureaucrats and the politicians can prove it is being distributed, as promised, to better advantage than it could be by those who produce it.

But how can we reduce the percentage of our national income taken by government? Of course the most ready answer is, reduce the costs of government. There is scant prospect that they will be materially reduced for many years to come. If the government costs were to remain fixed an answer would be, increase the national income. Both might be accomplished if jobs in productive private industry were found for the 11,000,000 unemployed.

The employment of most of these 11,000,000 depends on an increase in or a revival of capital investment in private enterprise. Plenty of available private capital exists but enterprisers are reluctant to use it; for while the continual investment of new capital in industry is highly desirable, it is seldom absolutely necessary. Most plants and obsolete equipment can continue to produce as long as competitors use the same kind of facilities. That is why rehabilitation in industry is contagious and comes in epidemics. We have not had such an epidemic since the New Deal took hold because too many producers have wondered whether they need ever worry again about larger or better producing facilities.

It seems that a large part of our present difficulty and lack of enterprise comes not merely from fears induced by New Deal abnormalities but from lack of appreciation of the changes that already have been wrought in business and industry. We have still to adjust our viewpoints to where we can see the necessity or inevitableness of spending a much larger share of income from production to do—ineffectively probably—what business and industry might have had the wisdom to do for itself. That is to care for the old, the sick and the needy. When realization comes, prices and incomes must be adjusted to carry this extra burden. We cannot compare present prices and incomes and taxes with what have gone before, because the relationships have changed so radically.

Nathan C. Rockwood

Letters to the Editor

Gypsum and Wood Wool

A reader in Germany has appealed to the Editor of ROCK PRODUCTS for information as to whether gypsum has been used in this country as a binding agent in the manufacture of wood wool building blocks. Similar blocks, using magnesite as a binding agent and distributed under the trade name Thermax, have been made in the United States, but no information is available as to the use of gypsum for this purpose. If anyone has such information, we shall appreciate having it.

THE EDITOR

Kiln Seal Rings

DEAR SIR:

It has taken me a long time to acknowledge your kindly and informative letter about kiln seal rings. Just now we are pushing the plant so hard that the inconvenience of a little dust is preferable to a shut down for a change at this point. From what you say, it appears that we must put a dry process seal on the kiln to obtain lasting satisfaction.

The calcinator is behaving splendidly now—we had our share of initial difficulties, but these are behind us and certainly this appendage to the kiln did all that the makers claimed for it. There seem to be about half a dozen points requiring attention with calcinators and when you pay attention to these, there is no trouble. Our dust loss is now down to 1 percent and with attention to the seal ring on the kiln, so that there is less air leakage, and therefore less gas volume passing through the calcinator, with corresponding decreased velocity, then dust loss will come down to a very low figure.

A week or so back we installed a British Rema unit coal mill, and this is giving excellent results, almost from the beginning. Output has been increased due to a more regular coal feed, and at the same time there has been a saving of at least 2 percent of fuel.

One thing must not be overlooked and that is: these aids to efficiency do their work and do it well, but they require closer control, and it would be impossible to operate them to the best effect without the aid of recording instruments. On our 10- x 125-ft. kiln with chains, we obtained a doubtful 1500 tons per week but we now have 2000 tons per week in sight.

Thank you again for your letter, and thanks all the time for the good things which come out in "ROCK PRODUCTS" month after month.

The intelligent use of trade magazines is just as essential as works modernization, and we hope that you will be able to give us some information on grinding.

Yours faithfully,
Goliath Portland Cement Co., Ltd.
Railton, Tasmania
L. R. DAVIES-GRAHAM
Chief Chemist

Ready Mixed Concrete

DEAR MR. ROCKWOOD:

I recently had the pleasure of reading the article written by Mr. Geo. Roalfe, describing our Soto Street batching plant, which was in the magazine that you edit and as is seldom the case, I found the article very complete and surprisingly accurate in detail.

In the past, men who have been writing about such plants have quite often exaggerated and distorted the article to such an extent that it bore little resemblance to the truth but not in this case. Here was an article that was interestingly written and accurately portrayed, and I wish to take this opportunity to thank you personally for the publication.

Yours truly,
PAUL C. GRAHAM, *President*
Graham Bros., Inc.
Los Angeles, Calif.

Problems of Heat Recovery

By C. M. BUTLER*

IT DOES not seem possible, that in former years any manufacturing plant wasted more heat energy than did the portland cement plant. The gases from the dry process kilns have a temperature of from 1200 to 1800 deg. F. as they leave the kilns. Formerly these gases were discharged into the air, but now in many plants they are drawn through boilers and made to produce steam for the turbines. Some plants operate the entire plant from gases that were formerly wasted.

The clinker discharges from the kiln at white hot heat of a temperature of 2700 to 2900 deg. F. It was formerly the practice to cool this clinker by storing on open piles. Originally the cooling of clinker was considered of little importance, and the clinker was dumped on open piles until it had become sufficiently cooled for handling.

This procedure interrupted the sequence of operation between clinker burning and clinker grinding. To overcome this difficulty and to make the process continuous the rotary cooler was introduced. However, no thought was given to the recovery of heat and dust that were lost from the cooler.

The next step in the development of the rotary cooler was to place it as an adjunct to the kiln whereby the air passing through the cooler absorbed the heat and was returned to the kiln as highly heated secondary air of combustion. The process was satisfactory but subsequent developments have proved that the quality of the clinker cooled in this manner was inferior to the clinker cooled in a more rapid manner.

The desirability of cooling the clinker quickly led to the development of air quenching apparatus. The economies effected by the latest type of air quenching coolers have decreased coal consumption approximately 15% and enhanced grindability approximately 20%, and the quality of the cement has been improved.

Exacting demands of the U. S. Government, state departments and engineers have made it necessary to effect refinements in the process of manufacture and where formerly fairly wide variations were permitted in the mineral components of cement these variations have been reduced so that they do not vary one-half of one percent from a predetermined composition. Formerly only the quantities of limestone and shale were accurately controlled but the demands have developed to such a point that in some specifications, exact limits of silica, alumina and lime are stipulated.

The progress being made in developing the manufacture of cement is so rapid, that a method in vogue a few years ago is found to be undesirable at the present time. For example where it was formerly satisfactory to hold the lime at the control point, now all the elementary compounds must be controlled.

* From "Technical Problems of the Cement Industry" by C. M. Butler, Marquette Cement Manufacturing Co. Proceedings of the Missouri Mineral Industries Conference held at Rolla, Mo., October 21 and 22, 1938.

No Fires At This Plant

Wooden structure destroyed by fire replaced with concrete and steel sand and gravel plant designed to meet demand for crushed products

By BROR NORDBERG

A FIRE broke out in the crusher room of the Keystone Gravel Company plant at Dayton, Ohio, in the Summer of 1936, destroying the entire superstructure over the bins. It was believed that the cause of the fire was a short circuit in a switchbox, but the extent of the damage resulted largely from the fact that everything was housed in wooden frame construction.

Regardless of the cause, experience gained from the fire was put to work in designing a new plant layout that is neither closed nor of combustible material. The plant is of the open type with steel construction. The bins, of concrete stave construction, were unharmed by the fire.

In designing the remodeled plant layout, the bin area and rise of the belt conveyor from the track hopper were limiting factors, but the new plant is decidedly more efficient than the old one and it has greater capacity. As the trend in recent years has been toward more crushed gravel, the plant was designed accordingly, and the crushed material is handled entirely separate from the natural gravel.

Although the original plant was built in 1921 as a dredge operation, pumping became difficult in 1928 due to conglomerate conditions in the deposit and it was discarded in favor of a dry method of excavation.

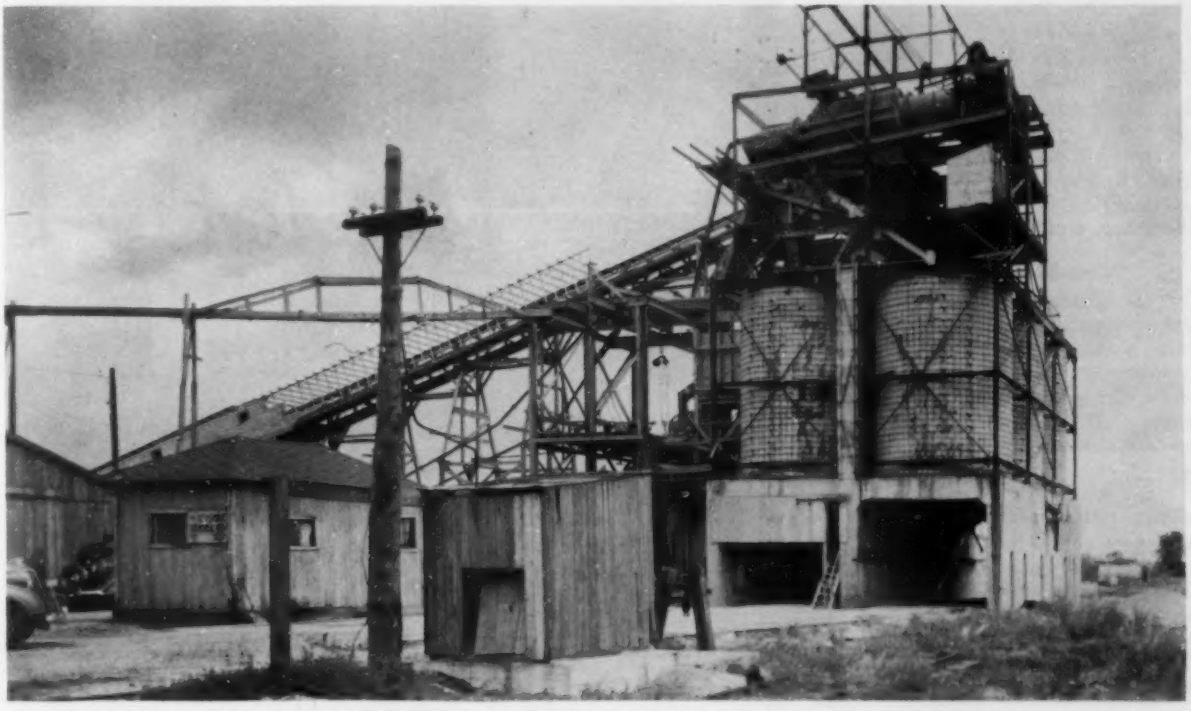
Change from Wet to Dry Excavation

A Whiley-Whirley 1½-cu. yd. electrically driven dragline loads the sand and gravel into Ford trucks of 3-cu. yd. capacity, which dump into a hopper of 50-cu. yd. capacity or to storage at the main plant conveyor. About 10,000 cu. yd. storage is maintained near the hopper feeding the conveyor where it can be easily transferred by dragline into the hopper.

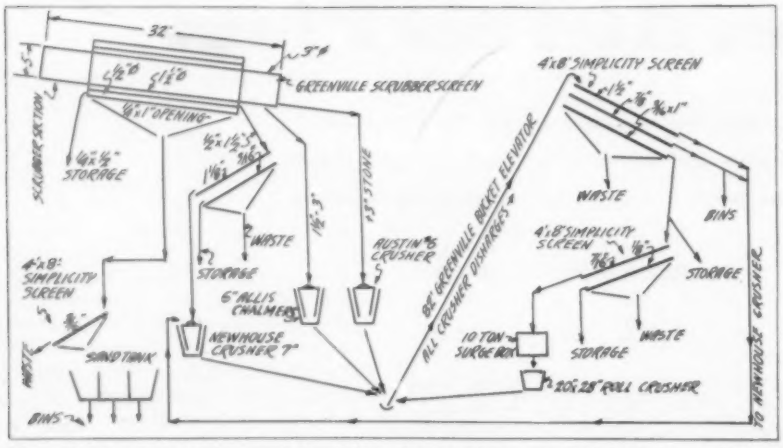
Feed from the hopper to the 30-in. belt conveyor, 294-ft. centers, is by gravity. This conveyor had been extended 50-ft. in length since the fire and its point of discharge is 4 ft. higher over the bins, to utilize gravity and the available space more effectively. A transfer is made from the long belt conveyor to a 30-in. shuttle belt conveyor, 15-ft. centers, which feeds into a Greenville combination scrubber and trommel screen, having a 5- x 12-ft. scrubber section. Overall length is 32 ft. including the screening surface, there being three screen barrels with 1½ and 3-in. openings, ½-in. openings, and ¼- and 1-in. openings, respectively, from inside to outside. The maximum outside diameter is 8 ft.

Screening Operations

About 3500 g.p.m. of water is added in the scrubber, separations being made at ¼-in., ½-in., 1½-in. and 3-in. Plus 3-in. gravel is chuted to an Austin No. 6 gyratory crusher. The 1½- to 3-in. gravel is chuted to a 6-in. Allis-Chalmers gyratory crusher, and the ½- to 1½-in. gravel



Steel screening plant rebuilt over concrete silo bins to replace wooden structure destroyed by fire. Combination scrubber and trommel screen located on top



Flow sheet of screening and crushing plant which was designed to produce a maximum of crushed products

is chuted to a vibrating screen where uncrushed gravel is sized. Minus ¼-in. material is handled independently in the manufacture of sand and will be discussed later in this article, while ¼- to ½-in. (pea) gravel is generally placed in a bin or can be graded further.

Uncrushed concrete gravel is made by passing the ½- to 1½-in. product over a 4- x 8-ft. Simplicity double-deck vibrating screen with 1⅛-in. and 3/16-in. openings on the top and bottom decks. Plus 1⅛-in. (1⅛- to 1½-in.) gravel is put through a 7-in. Allis-Chalmers Newhouse crusher, and the 3/16- to 1⅛-in. gravel is put in a bin. The 3/16-in. cloth sets the lower limit on the concrete gravel and is a dewatering screen cloth, the throughs fluming to waste. Wash water is applied on the top deck of this screen and all other vibrating screens. While this screen is for the purpose of sizing natural, uncrushed gravel by putting ⅝-in. screen cloth on the upper deck, more crushed gravel can be produced in passing the oversize gravel to the Newhouse crusher.

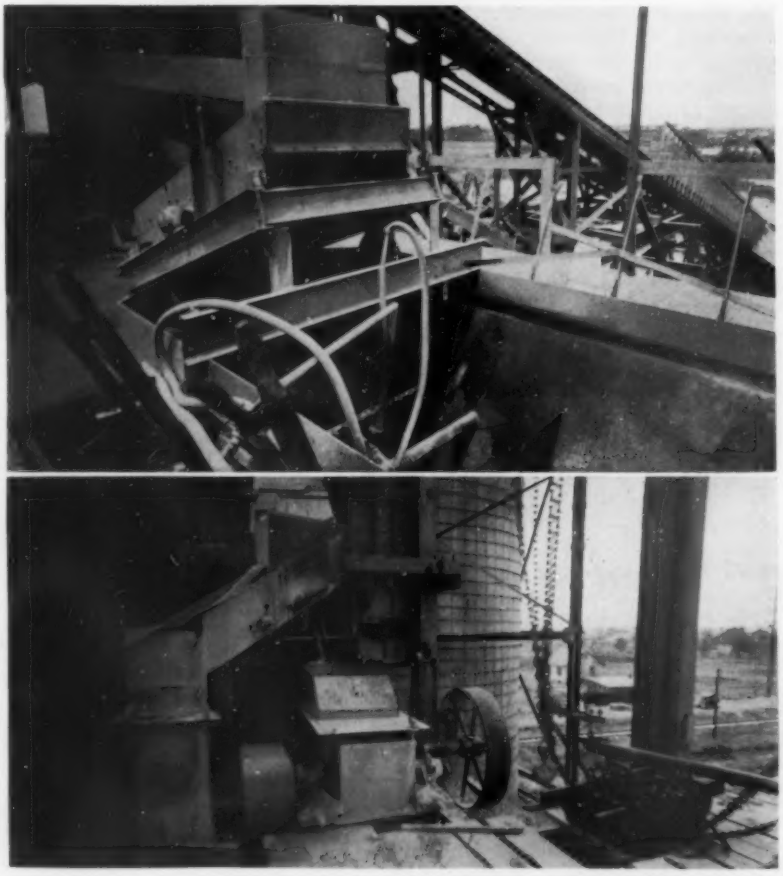
Crushing Methods

The crushed product from all crushers joins in the boot of a Greenville bucket elevator, 82-ft. centers, and is carried back to the top of the plant for sizing. Here it is passed over a 4- x 8-ft. Simplicity triple-deck, vibrating screen with 1½-in. and ⅞-in. square openings on the top and intermediate decks, and 3/16- x 1-in. slotted openings on the bottom deck.

Plus 1½-in. material is put through the Newhouse crusher, and the ⅞- to 1½-in. gravel is either chuted to the same crusher or placed in storage. The 3/16- to ⅞-in. product retained on the bottom deck is placed in storage or put over another 4- x 8-ft. Simplicity double-deck screen for further separation. In this case the vibrating screen has 7/16-in. square openings on the top deck and ⅛-in. square openings on the lower deck, the ⅛- to 7/16-in. product going to a bin and the plus 7/16-in. gravel to a 10-ton surge box for further recrushing, to produce more ⅛- to 7/16-in. chips, used in blacktopping and for patchwork. From the surge box, gravel is fed to a 20- x 28-in. Greenville double-roll crusher fed by a New Holland pulsating feeder.

Minus ⅛-in. stone is flumed to waste and the roll crusher product is elevated and put back over the screening equipment. This completes the circuit for the crushed gravel. At the primary revolving screen, minus ¼-in. sand is flumed to a 4- x 8-ft. Simplicity single-deck screen with 3/16-in. square openings.

Oversize is wasted and the throughs enter a three-compartment steel sand box. The box is 12 ft. long, 7 ft. 6 in. in height and tapers from a width of 8 ft. at the top to 2 ft. at the bottom. Concrete sand, filter sand and masons or brick sand are produced in the three compartments, by the proper use of water currents supplied through pipes in the bottom of the tank. About 20 tons per hour of filter sand are produced, and the plant capacity is 1500 to 1800 tons in 10 hr.



Above: Minus ¼-in. material from the trommel screen in background is laundered to the vibrating screen where oversize is wasted and the fines enter a sand tank below having three compartments. Below: Gravel is fed to a Greenville double-roll crusher by a New Holland pulsating feeder

How Much Does It Cost?

Simple but comprehensive accounting system requires small staff. Time saving methods and extensive use of slide rule reduce work to a minimum

By KELSEY D. HOWINGTON*

IN THIS ARTICLE the cost system now in use by the Consolidated Quarries Corp., Lithonia, Ga., will be described in considerable detail, but it is presented entirely from the angle of direct plant expense since it is thought that the controlling general book accounts and overhead items would depend more on the financial structure and size of the operation. It will be published as a series of two articles, the second part to follow in the October issue.

All of the plant accounting is handled by the assistant treasurer and one plant clerk, thus the office force consists of only two employes. Although the system used is very comprehensive, it is possible to handle it with a very limited office force due to the system used, adoption of time saving methods, and the extensive use of the slide rule. The use of the slide rule will be discussed more fully in a later paragraph.

Divide Plant Operation Into Four Departments

The crushed stone plant has a capacity of 200 tons per hour. In addition to crushed stone, concrete brick are produced as a means of disposing of an excess of fine material. The plant operation is divided into four departments, each headed by a foreman reporting directly to the superintendent, as follows:

QUARRY: This department covers the operation up to and including the delivery of the stone to the first crusher. The 100 series accounts present the costs of this department.

Kelsey D. Howington

MILL: This department covers the operation up to and including the loading of the finished product in cars or trucks, and costs of the department are shown by the 200 series accounts.

MECHANICAL: This department covers the shop and repair expense, and costs are shown by the 300 series.

BRICK: All expense of manufacturing and preparing brick for market is charged to this department, and costs are shown by the 800 series.

Office and sundries are carried in the 400 series accounts.

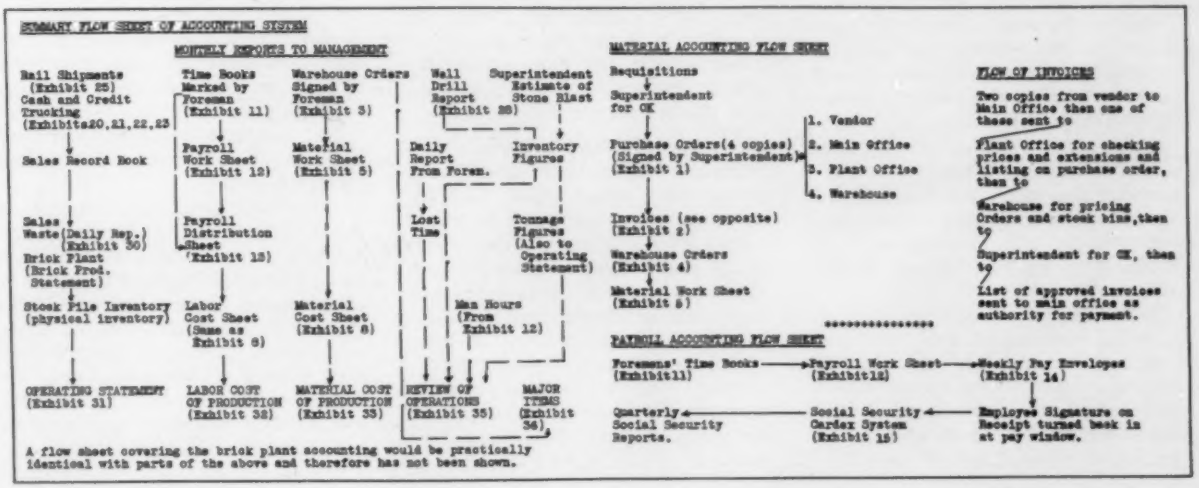
The summary flow sheet at the bottom of the page will give the reader an idea of the system as a whole.

Clear All Material Requisitions Through Central Warehouse

A central warehouse is located near the machine shop through which all materials move, and one man is on duty at all times when any or all of the plant is being operated. The foreman in each department keeps a check on any major item of material which may be needed for replacements and, in ample time before any item will be needed, he makes out a requisition on a sheet of scratch pad paper showing the specification of the item wanted, the account number covering the machine or job on which it is to be used, and the estimated cost of the item.

These requisitions are turned in to the warehouseman each day. The warehouseman keeps a check of the material carried in stock and when

* Assistant Treasurer, Consolidated Quarries Corp., Lithonia, Ga. Mr. Howington has been with the company since 1928, and acquired the degrees of L.L.B. and C.P.A. in his spare time.



any item usually carried in stock has been requisitioned out of the warehouse or the quantity of any items becomes low he makes up a requisition showing that the items covered are required for Warehouse. These requisitions are turned in at the plant office each day and placed on the superintendent's desk where he checks them as to quantity, necessity of the items, and the correctness of the specifications. The superintendent then initials the requisition and decides where the items shall be purchased. The Warehouse account is also used to distribute all items such as intangibles other than labor.

Method of Handling Purchases

A purchase order is written covering each requisition as shown by exhibit 1. This purchase order is written in quadruplicate and numbered consecutively, the original mailed to the vendor, one copy for an unfilled order file at plant office, one copy for main office, and one copy for the warehouseman's file of unfilled orders. After the information has been filled in with all copies in the machine, the original copy is removed and the additional information filled in on the other three copies: the estimated total cost of the order and the account for which the material has been ordered. This latter information is particularly useful in enabling the main office to know at all times the approximate amount of outstanding orders and is an aid to the warehouseman when checking in and storing shipments as they are received. The plant office copy has additional blanks to be used in recording partial shipments, date shipments are promised, date shipments are received, amounts of freight and express, and invoice amounts. A 4- x 6-in. card index is used for cross-indexing and shows vendor's name, purchase order No., and a brief description of items ordered. We have found this cross-index very useful in referring to items purchased several years previous to the time it is desirable to refer to them.

Plant office copies of purchase orders are filed alphabetically by vendor and the warehouse copy is filed numerically. All shipping notices, correspondence, etc., pertaining to a purchase order is attached to the order.

When an order has been filled or a partial shipment received the warehouseman stamps his copy of the purchase order with a rubber stamp in the form shown in exhibit 1, filling in the date received, whether by freight or express, and if the material immediately moves out to the job he indicates this fact and the fact that the material has been properly charged out by filling in the account number to which it is charged in the space provided; otherwise he indicates that the material has been stored in the warehouse by checking the warehouse space provided by the stamp. If a partial shipment has been received he initials the items received by an A, marking the first stamp used by the same letter, and then all orders on which a shipment has been received are sent to the plant office. The information is then posted at the plant office to the unfilled orders. As you will note from exhibit 1, we request vendors to show our order number on all packages, invoices, and correspondence for this assists us materially in checking in shipments, checking invoices against the purchase orders, and in keeping all correspondence with the correct purchase order.

Recording Invoices

Invoices are received in duplicate at the main office where they are posted in an invoice record book and if they cover any material chargeable to the plant they are extended to a warehouse column. This gives the main office or general books controlling account a charge for all material moving to the plant. Copies of the invoices are then sent to the plant office where they are checked against the purchase order file, stamped as shown in exhibit 2, and the required information filled in. These stamped invoices are then sent to the warehouseman for his use in charging out large items and in posting prices to the storage bins.

After being checked by the warehouseman these invoices are returned to the plant office where they are initialed by the superintendent as being OK for payment. A list of OKed invoices showing only the name and amount is then typed and sent to the main office as a record that the material has been received and that the invoice is approved for payment.

Warehouse Orders

Each foreman is provided with warehouse order pads, covers on which show all the account numbers and names, as shown in exhibit 3. When any material is needed on the job the foreman in charge writes out an order showing the account number to which it is charged and the quantity and articles needed. He then signs this order and gets the material from the warehouseman. All items of material leaving the warehouse are covered by signed orders. after pricing and extending the orders, the warehouseman makes up a summary sheet each morning listing the number of orders to each account number, the total in money for each account, and the grand total. An order is signed on any new equipment items and these are listed underneath the regular operating material items.

Dynamite and Supplies

Dynamite and explosives supplies are handled differently from other materials. Since the magazines are located quite a distance from any other part of the operation and the regular dynamite men do all of this work and go directly from the magazines to the quarry, this item is handled by a monthly physical inventory and the record on it is kept in a dynamite and supplies record book with one sheet for each item and each sheet showing: date, purchase order number, quantity, date received, value, quantity on hand, quantity received, quantity used, and balance carried forward.

After the physical inventory is taken at the end of each month, the amount used during that month is figured and this amount is added to the balance brought forward from the previous month. From the latter amount the charge out for the current month is subtracted and the balance carried forward to the next month. The dynamite and supplies are charged to the warehouse on the

(Continued on page 38)

EXCHANGE IDEAS

It has been suggested that an article covering the system and records used in accumulating and presenting cost figures by a crushed stone producer would possibly be of interest to the other members of this industry. It is hoped that this article will contain ideas on the subject which will be adaptable to other plants and that it will be followed by articles covering other systems in use. In such an exchange of ideas it is possible to work toward a more uniform system of accounting for the industry as a whole and to assist each other in the adoption of methods to keep a closer check on expenses, thereby reducing costs.—THE AUTHOR

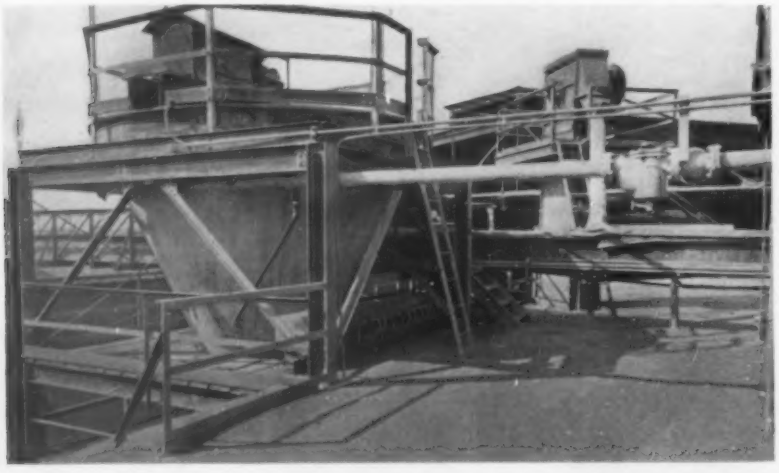
Exhibits of Accounting Forms

Cooling Portland Cement

Reduce finished cement temperatures from 200 deg. F. to 140 deg. F. in bulk handling with cone-shaped cooler by means of flowing water

By BROR NORDBERG

FINISHED CEMENT temperatures usually run in the neighborhood of 200 deg. F. when taken in bulk from the stockhouse of the Louisville Cement Co. at Speed, Ind. For ordinary weather conditions, temperatures this high cause no inconvenience, but during the hot summer months difficulty is experienced by laborers in handling cement from cars at destination.



Cooler installed to receive cement directly from the finish mills by screw conveyor. Note series of inlet pipes at the bottom foreground for the introduction of compressed air into pneumatic feeder. Main screw conveyor to the right

To make their task easier the company installed a cement cooler in 1938 which dropped the temperature from 50 to 60 deg., and in the future it is planned to cool all cement manufactured during the months from May through September.

The cooler, manufactured by F. L. Smidth & Co., New York, N. Y., is the first of its type installed in an American cement plant. It comprises an inverted steel cone through which cement is introduced at the bottom and is then passed in a thin film along the inner face of the outside steel plate to discharge at the top. A continuous film of water moving over the outside of the cone takes up the heat passing through the shell.

Within the cone is an agitating device consisting of a vertical shaft carrying agitator arms which are interconnected by flights parallel to the sides of the tank. The rotation of the agitating device, at 90 to 100 r.p.m., creates a centrifugal force and a suction causing the cement to be conveyed upward in a thin layer next to the tank wall to discharge at the top. It is necessary that cement be uniformly fed to the cooler in a fluffy state in order for the agitator scrapers to operate effectively.

The particular cooler installed by the Louisville Cement Co. has 270 sq. ft. capacity, and is located between the clinker grinding building and the stockhouse adjacent to a 16-in. screw conveyor carrying the finished cement. From the screw conveyor housing, an adjustable slide valve releases any desired part of the cement stream into a pneumatic feeder serving the cooler, and the cooled cement returns into the same conveyor to blend with the fraction not cooled.

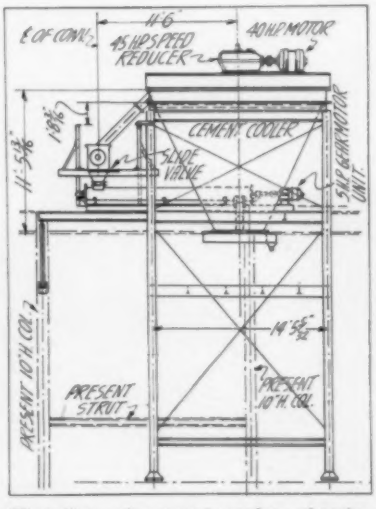
The 12-in. pneumatic feeder, which receives the cement from the main screw conveyor, is nothing more than a horizontal chamber into which air is introduced for its entire length at regular intervals with blades rotated intermittently to keep the material agitated. Air is introduced at 10 p.s.i. at the rate of 10 c.f.m. to create the needed fluidity. The feeder shaft is driven by a 5-h.p., 44 r.p.m. Westinghouse gearmotor unit through a Link-Belt type A flexible coupling and the agitator within the tank is driven at 90 to 100 r.p.m. by a 40-h.p. Allis-Chalmers motor through a Falk vertical speed reducer. At this speed the cement film next to the tank housing is about 1½ in. in thickness.

Creek water, at 80 to 90 deg. F. in the summer, is used for cooling. The water is pumped into a 5-in. diameter pipeline encircling the top of the cooler, and is released continuously at 5 p.s.i. through 3/32-in. diameter holes to the cooler surface. When the cooler plate is free from scale, a continuous bath of water runs down the outside to the bottom where it is trapped and run to waste. The pump handles about 4000 gal. of water per hour in normal operation.

It is dust-tight and requires no added labor other than the removal of lime deposit and surface scale from the outside wall. This deposition is removed about once in five months simply by the use of wire brushes.

The Speed, Ind., plant has a rated capacity of 5000 to 6000 bbl. of standard portland cement in 24 hr., and also manufactures high early strength cement. Kilns are equipped with Vanderwerp heat recuperators

(Continued on page 33)



Elevation of cement cooler, showing installation details

Crushed Stone Directors Ponder Industry's Problems

By NATHAN C. ROCKWOOD

PROPOSED SEASONAL exemption of the industry's employes and determination of the Walsh-Healy public contracts act's "prevailing minimum wage" in the industry were the most important matters considered by the board of directors of the National Crushed Stone Association at its annual midsummer meeting—this year, July 20, at the Westchester Country Club, Rye, N. Y.

Because of illness of the president of the association and the chairman of the board, T. I. Weston, the board unanimously chose past president, Otho M. Graves, to preside. Mr. Graves reported informally on the industry's application for exemption from the federal wage and hour law because of its seasonal character. The position of the quarry industry is somewhat complicated by the fact that some limestone quarries supplying flux stone for steel manufacture operate longer seasons in many instances than quarries supplying aggregates and ballast. Mr. Graves told of the presentation of the case at the public hearing in Washington, reported in the July issue of ROCK PRODUCTS. No decision has been rendered up to this time.

Minimum Wages Under Walsh-Healy Act

The attempt of the federal government to establish prevailing minimum wages in the crushed stone, sand and gravel and slag industries, to be applied whenever a producer is selling direct to a federal project in amounts in excess of $10,000, was discussed informally in considerable detail by L. Metcalfe Walling, administrator, Division of Public Contracts, U. S. Department of Labor. He is the administrator of the Walsh-Healy act, not to be confused with the so-called wages and hours law which establishes fixed minimums for all labor.

Administrator Walling pleaded for the industry's coöperation and understanding — especially when it comes to filling out the voluminous questionnaires. One difficulty met with in these industries is distinguishing between skilled operative labor and common labor, since one and the same man may fill various jobs at different times as is required by operating conditions. Consequently comparison of questionnaires and properly weighing returns is a hard problem.

Federal Legislation

Other matters discussed were the semi-annual reports of the administrative and engineering directors of the association. In his report as administrative director J. R. Boyd reviewed federal legislation and prospects for more, as it affected the crushed stone industry. Referring to the Relief Act of 1939, which appropriated $1,477,000,000 for W.P.A., Mr. Boyd said: "Of particular interest to the crushed stone producers is that section of the act which provides that no W.P.A. funds shall be used by any federal, state or other agency to purchase, establish, relocate or expand mills, factories or plants which manufacture or produce for sale articles, commodities or products in competition with existing industries. It is further provided that funds appropriated shall not be used for the purchase of any construction equipment or machinery in any case in which such equipment or machinery can be rented at prices determined by the commissioner to be reasonable."

New Members

Mr. Boyd reported the following new members of the association as a result of field contacts: Cerulean Stone Co., Cerulean, Ky.; Gager Lime Manufacturing Co., Chattanooga, Tenn.; Kentucky Stone Co., Louisville, Ky.; Tyrone Lime & Stone Co., Tyrone, Penn.

A. T. Goldbeck reporting as engineering director, covered briefly the activities of the bureau of engineering of the association. Speaking of possible future activities Mr. Goldbeck said: "In the field of highways a lot of research work remains to be done. A recent report by the engineer of tests of the Kentucky State Highway Department making a comparison between service results and laboratory tests brings out very forcibly the superior results shown by limestone concrete as compared with the chert gravel concrete used in that state. The main point of the report, however, is that service results demonstrate rather definitely that our accelerated soundness tests for aggregates are at fault. These tests reject certain limestones which have given good results in service and accept certain gravels which are giving exceedingly bad results. The

Left: Wilson Foss, chairman of the board, New York Trap Rock Corp., left, and Stirling Tompkins, president, New York Trap Rock Corp and Reid Callanan, president, New York State Crushed Stone Association. Right: "Oh, how I wish this was the 19th hole," says "Bill" Andrews

use of surveys of highways to demonstrate the superior merit of stone seems to offer very considerable promise. This requires an adequate organization and the most we can do is to urge that this type of work be undertaken by the various state highway departments."

Convention Dates Fixed

Jointly the executive committees of the National Crushed Stone Association have tentatively fixed January 17, 18 and 19 for the Sand and Gravel Convention and January 22, 23 and 24 for the Crushed Stone Convention. This action of its executive committee was confirmed by the directors of the N.C.S.A., but has yet to be acted upon by the directors of the N.S. & G.A. The conventions are scheduled for the Jefferson Hotel, St. Louis, Mo.

Present and Accounted For

The following directors were present: W. M. Andrews, J. R. Boyd, Harold R. Brownson, J. Reid Callanan, A. R. Couchman, F. O. Earnshaw, A. T. Goldbeck, Otho M. Graves, W. E. Hilliard, N. E. Kelb, H. E. Rainer, Russell Rarey, J. A. Rigg, Dan R. Sanborn, James Savage, F. W. Schmidt, Jr., L. W. Shugg, Stirling Tomkins, Roy Wills, A. L. Worthen. The guests included A. J. Blair, first president of the association, Wilson Foss, Bruce Shotton, W. E. Trauffer and Nathan C. Rockwood—and the wives and families of some of the directors.

Crushed Stone Golf

TIME was when we would hesitate to show golfing pictures of a directors' meeting. But times have changed. The industry now knows that directors accomplish much work and assume many responsibilities. They are entitled to a little recreation along with these. And being a much worse golfer than any of the celebrities here shown we dare to print these pictures of their "form." So craving their indulgence, as we are sure of their interest, here goes:

1—Otho M. Graves, who plays in the eighties, tees off
2—Russell Rarey does his stuff
3—Otho M. Graves displays another stance, while Russ Rarey looks on critically
4—Albert L. Worthen finishes a poke
5—W. M. (Bill) Andrews shows a proper finish of his stroke
6—J. Reginald Boyd completing his 385-degree swing
7—"Reg" is in difficulty
8—But he comes out, at least part way
9—Wilson Foss, who plays in the low eighties—guess why?
10—And "Wils" takes care to putt accurately, too

Phototube and optical system with adjustable aperture

"Electric Eyes" Control Kilns

"Electric Eyes" or photo-tube pyrometers are instantly responsive to energy radiated from clinker, and control speed, temperature, and kiln feed

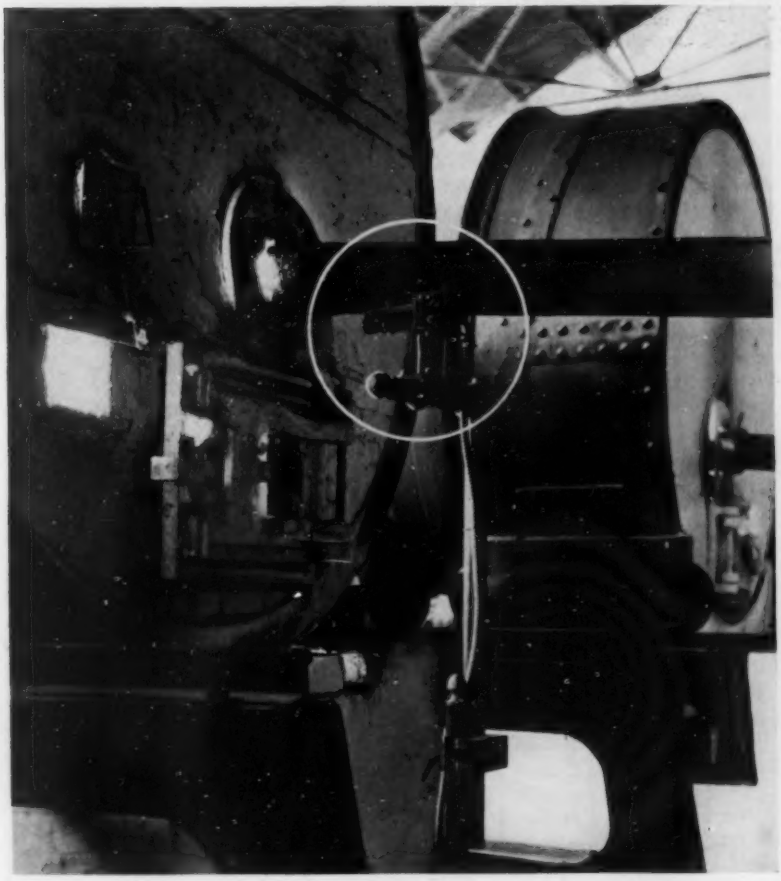
By R. H. ROGERS*

TEN KILNS are being operated by Lehigh Portland Cement Co. under vacuum tube temperature control at the Fogelsville plant near Allentown, Penn. The control equipment, developed by General Electric Co., makes use of phototube pyrometers which are instantly and constantly responsive to the energy radiated from the clinker to which they are exposed. By means of other tubes, contactors and other devices, temperature of the clinker and the speed of the kiln are both indicated and recorded for each kiln, and the kiln speeds are controlled automatically to hold the temperatures within the zone previously manually selected by the burner.

It is axiomatic that the fewer variables that enter into the making of cement, the better the cement will be and more of it will be made. Without attempting difficult rigid comparative tests with and without this control, the Lehigh Portland Company believes that its use is justified. Bearing out this belief, four more equipments have been ordered for the Alsen mill at Alsen, N. Y., which is being completely remodeled.

It may be noted that the temperature and speed recordings are made on separate recorders at the Fogelsville mill, but that at Alsen the two records will be made side by side on the same chart to avoid all chances of mismating charts.

*Industrial Department, General Electric Co., Schenectady, N. Y.



Close-up of phototube pyrometer installation on kiln. Note phototube pyrometer within circle

Description of "Electric Eye"

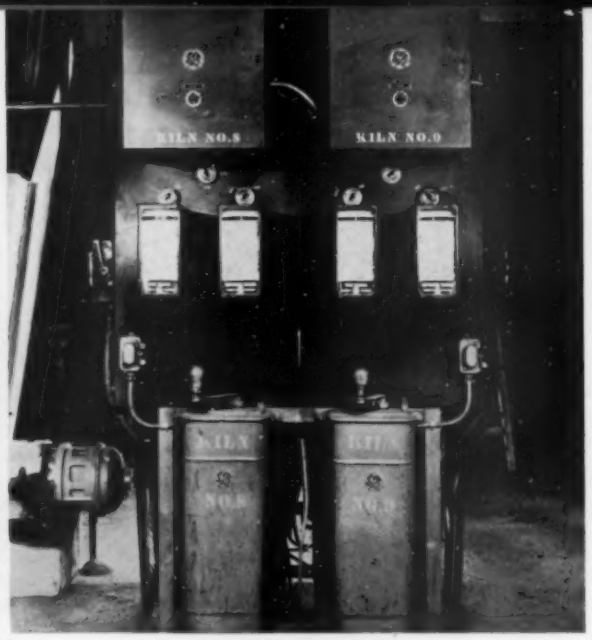
Without going too deeply into electronics, a brief description of the system follows:

The motors driving the kiln are of the wound rotor (slip-ring) type, and hence speed control is by secondary resistance, speed adjustments being accomplished by contactors which short out in two steps about 20 percent of the total resistance used.

A-c. at 110 volts is supplied to the control equipment; this supply is subject to considerable voltage variation. A single tube with two anodes is used to rectify the a-c. to d-c. A voltage regulating tube holds constant voltage on the cathode circuit so that the electronic emission is constant. The d-c. output of the rectifier is controlled at 90 volts by another voltage regulating tube that offsets any variation in the voltage impressed on the rectifier tube anodes. Hence the control is not affected by a-c. voltage variations. Direct current resulting is passed through a smoothing reactor or filter system to iron out the ripples inherent in single-phase, full wave rectification.

The 90 volt d-c. is impressed on a phototube which, when dark, passes no current, but when illuminated passes current proportional to the light impressed. In front of the tube, a lens and aperture are provided, and the system is focussed on the brink of the clinker cascade as it

Ten kilns, all equipped with phototube pyrometers which indicate and record temperatures and control kiln speeds, have been in service over six months



Two sets of control equipments, showing automatic control panels at top, indicating and recording instruments in center, and drum switches for starting and manual speed adjustment

emerges from actual contact with the flame. Any change in clinker temperature involves first, a like change in radiant energy, and second, a like change in the current passed by the phototube.

A resistance of many megohms is connected in series with the tube, and variation in current produces like variation in the voltage drop across this resistance. Thus current variations are interpreted in voltage variations.

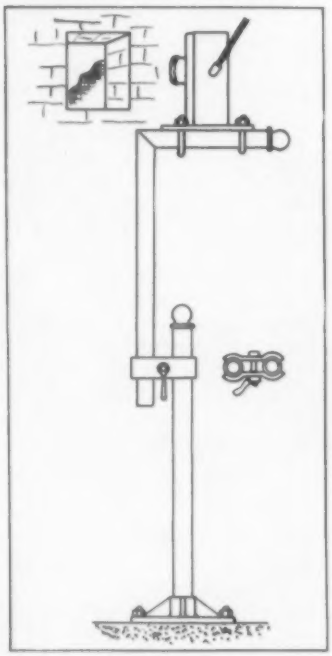
An amplifying tube is introduced here, across which the 90 volt d-c. is impressed. A grid in this tube is connected to the phototube resistor and acts as a damper or valve to control the thousand times greater flow of current through the amplifying tube. This new output is sufficient, first, to indicate and record the temperature as "seen" by the phototube or "electric eye," and second, to act upon the grids of power tubes which pass sufficient current to operate contactors in the wound rotor secondary resistance circuits.

A small "tachometer" generator is sprocket-and-chain driven off the kiln drive, and its output actuates the speed indicator and recorder on which the voltage range is calibrated in revolutions per hour.

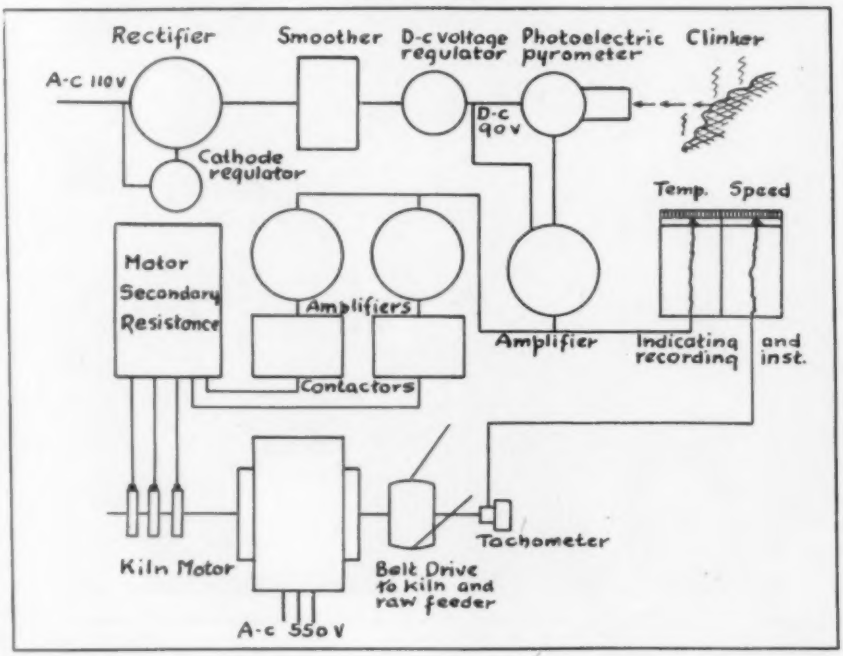
Normal drum switch control is used on the kiln motor for starting and zone speed setting. Once brought up to speed, the automatic phototube control takes charge, and thence regulates the kiln speed to hold the temperature within reasonable limits.

The dry screw feeder is driven by chain and sprocket from the kiln drive, hence is synchronized, and any change in kiln speed is accompanied by a like change in feed. Fuel, air and draft are under independent manual control.

Phototube pyrometer support, providing universal adjustments



Schematic diagram of connections for tubes and auxiliaries for temperature control through kiln speed



Clarify Federal Legislation At West Coast Meetings

Executive Secretary, V. P. Ahearn, meets with sand and gravel and ready-mixed concrete producers of the West to discuss local and national problems

By BROR NORDBERG

A TOUR of the West Coast was recently completed by V. P. Ahearn, executive secretary, National Sand and Gravel Association and National Ready-Mixed Concrete Association, during which he was the principal speaker before several important meetings. His trip began with stops at St. Louis, Mo., and Denver, Colo., where he held conferences with individual association members, and was concluded with organized meetings at San Francisco, Calif., Palo Alto, Calif., and Los Angeles, Calif.

V. P. Ahearn addressing San Francisco, Calif., meeting of sand and gravel producers. Anson S. Blake, Blake Bros. Co., San Francisco, Calif., and F. P. Spratlen, Jr., Spratlen-Brannon, Inc., Denver, Calif., visitor, also may be seen

California producers of rock, sand, gravel and ready-mixed concrete took advantage of Mr. Ahearn's trip west and the principal producers turned out in large numbers to welcome him and listen attentively to his analysis and interpretation of existing and pending laws which have and will have important effects on these industries. These were the San Francisco and Los Angeles meetings. At Palo Alto, on July 26, Mr. Ahearn appeared before the Western Conference of Trade and Commercial Organization Executives as the principal speaker. His paper was "Association Activity in the Field of Employer-Employe Relations."

Anson S. Blake, president of the Rock, Sand and Gravel Producers Association of Northern California, presided at the San Francisco luncheon meeting at the Palace hotel on July 25, and Robert Mitchell, president, Consolidated Rock Products Co., Los Angeles, was chairman of a dinner meeting held July 31 at the Jonathan Club in that city.

Mr. Ahearn's prepared papers were similar for the two meetings and the subject matter such that they were followed by spirited questions and discussion from the meeting floor.

The forthcoming investigation of the building industry by the Department of Justice was discussed in some detail by Mr. Ahearn, who described it as an integrated attack to be made on the building industry as a whole. All divisions of the industry are to be cited for alleged illegal practices. Producers of building materials will be investigated for improper use of patents, basing points, zone price systems, joint selling agencies, allocation of business and for discriminatory action against competitors, merger of competing enterprises and other practices which are deemed unfair, said Mr. Ahearn.

Building Industry Investigation

Distributors of building materials are alleged to have used fixed markups, to have conspired with manufacturers to establish joint price controls and are to be charged with boycotting of manufacturers who refuse to cease dealing with price-cutting distributors. They are also to be cited for boycotting manufacturers who sell direct to the ultimate consumer, requiring the manufacturer to pay a commission even though the manufacturer and consumer deal direct.

Wholesale distributors are to be investigated for boycotting manufacturers who sell direct to retailers, and manufacturers who sell to non-member wholesalers and contractors will be cited for the use of bid depositories, central estimating bureaus and bidding rings in which the job allocation is arranged to the exclusion of outside contractors.

To Probe Boycott of Ready-Mixed Concrete

Building trades unions are alleged to have used strong-arm squads for collusive agreements among producers and distributors, and to have refused to permit use of new products or new processes. Mr. Ahearn mentioned that operating engineers' trade unions will prevent the use of ready-mixed concrete wherever they can and are becoming increasingly hostile. As examples, he mentioned the case of Chicago where thus far engineers' unions have successfully prevented any activity in this industry and not a single plant has been estab-

In this picture of the San Francisco meeting may be seen E. J. Goodpastor, Pacific Coast Aggregates, Inc.; M. McIntyre, Basalt Rock Co., Inc., and E. A. McAllister, Hutchinson, Co.

Left to right: J. H. Summers, rock plant manager; N. J. Redmond, secretary-treasurer; Mel Erskine, transportation manager; all representing Blue Diamond Corp., Ltd., Los Angeles, Calif.

lished. He also mentioned the East Chicago, Ind., plant which was boycotted to force the company to employ an operating engineer in addition to a driver on each mixer truck.

Other investigations will likely be made on local legislative restraints—oppressive building codes, and the enactment of licensing and registration laws which permit local groups to monopolize private and public construction.

Mr. Ahearn said that 25 or more grand juries throughout the country will receive evidence and there are indications that civil remedy will be sought. He suggested to producers of aggregates and ready-mixed concrete at both meetings that, should an investigation be made of their activities, they coöperate with the investigator as much as is practicable.

Building Material Prices

Another investigation on the docket by the Temporary National Economic Committee will cover building material prices. This attack, according to Mr. Ahearn, will be concentrated on home building because of the popular and political appeal. The committee, in his opinion, has started from a conclusion, and evidence has been designed to support it, that monopolistic practices have caused homes to be placed beyond the reach of the average citizen and that the result is a curtailment of employment.

Trade Associations

A third focal point for a federal investigation by the Department of Justice is trade associations. There is no intent to attack trade associations in themselves, but the activity will be directed at certain trade associations operated by management engineering concerns. In Mr. Ahearn's opinion this investigation is in order since coercive practices have been used in many cases and anti-trust laws definitely violated. He believes that legitimate trade associations are considered of great benefit to industry and are looked upon with favor.

Wages and Hours

The Federal Wage and Hour Law, which at least as yet does not apply much to the aggregates industry on the West Coast, was commented on briefly. The basic provisions of the statute were outlined in brief, and the association's activities in regard to the exemption of seamen and seasonal exemption which affect so many producers in other parts of the country. So far, Mr. Ahearn said, the greatest objection to the law has come from the workmen themselves because their hours of employment are limited. There is some likelihood that it will fail, Mr. Ahearn believes, and this failure will come about because the men do not want it or that it is impossible to administrate. The time and one-half penalty works a hardship on the aggregates industry in his opinion.

Walsh-Healey Act

Another piece of legislation discussed by Mr. Ahearn, and one that does affect west coast producers of aggregates considerably, was the Walsh-Healey Act which at present applies on government contracts exceeding $10,000, with an 8-hr. day and 5-day week limitation and time and one-half for overtime.

Provisions within the Act commented upon by Mr. Ahearn included: Child labor, safety and health, partial employment on Walsh-Healey contracts, and exemption of office and custodial employes. To date aggregate contracts executed under the Act have exceeded $16,000,000.

Proposed amendments would lower the contract minimum from $10,000 to $4,000 and make the Act apply to sub-contracts. In Mr. Ahearn's opinion, these amendments will not pass. The National Sand and Gravel Association, he said, had been asked to assist in a determination of minimum and prevailing wages for its industry members and urged producers to coöperate in filling out and returning questionnaires regarding rates of wages which will be mailed out. After results from the questionnaires have been compiled, a public hearing will be held and a minimum rate of pay will be determined for the industry.

Federal Works Agency

Considerable discussion concerned federal aid for highway construction and the possible effects to its continuation now that the U. S. Bureau of Public Roads has been included as a federal works agency. This transfer, from the Department of Agriculture, might possibly have some effect on future monies to be made available for highways, in Mr. Ahearn's opinion. Failure of the states to match federal funds has prejudiced continuation of federal aid and he cautioned that the federal aid bill must come up again soon for consideration.

Superhighways

More than $200,000,000 of highway funds has been diverted, New York State heading the list with $75,000,000 annually. Delaware has incorporated highway money into its general fund, which is unfavorable to highway construction in that state. Some favorable progress, however, was mentioned in regard to diversion. Four states now have constitutional provisions against diversion and California, Michigan and New Hampshire adopted anti-diversion amendments at their last general elections. The highway user is now paying out 40 percent of all state incomes.

In discussing possibilities for construction of superhighways, Mr.

A close-up of John E. Porter, Granite Rock Co., Watsonville, Calif.

Another group at Los Angeles meeting. Those identified are: R. Griffin, production manager, Consolidated Rock Products Co., Los Angeles, Calif., and John Gregg, Whittier, Calif.

Ahearn reminded his audience that the Bureau of Public Roads had found them economically impractical. Producers were urged not to contribute any money toward support of such projects. He also referred briefly to the president's new self-liquidating program of $350,000,000 for water works, sewage disposal plants, bridges and hospitals and $750,000,000 for high-speed highways and toll bridges.

WPA Activities

Mr. Ahearn thoroughly covered the effects of the WPA program on the aggregates industry. The WPA has given established industry considerable business in some states but has practically doomed private industry in others. Nebraska, Kansas, North Dakota and South Dakota were mentioned as a few agricultural states very seriously affected. The WPA activities were summarized with some reference to the AFL "prevailing wage" dispute and the amendment regarding competition with private enterprise.

N. L. R. A. As It Affects Aggregates Industries

In discussing the National Labor Relations Act, which has little direct effect on the aggregates industry but a tremendous indirect effect through the use of boycotts, Mr. Ahearn said that some very bad contracts had been written in the industry but that an improvement was being noted in contract provisions. Mr. Ahearn was very impressed with the work which Mr. Dennis, secretary, Rock, Sand and Gravel Producers Association of Northern California has been doing in the San Francisco area and the healthy relations being maintained between producers and unions by an intelligent, well-organized approach. Activities of Mr. Dennis and his Association in forming union contracts were covered thoroughly in ROCK PRODUCTS, p. 48, December, 1938. The policy, in brief, is to have one uniform agreement throughout which is arrived at by proper organization. Mr. Ahearn also cited Mr. Cronin's testimony for the automobile industry. This part of his paper was concluded with the statement that the basic principle of the Act is permanent legislation and that most of the New Deal laws are permanent in their principles.

Repeal of the undistributed profits tax will likely help to stimulate recovery, said Mr. Ahearn, by re-investment of funds.

Another subject taken under consideration was the Wagner Public Health Bill. Health in his opinion is far more important to industry than ever before. Physical examinations of all prospective employes, and even periodic examinations, were recommended. Workmen's compensation laws are being written in many instances to include occupational diseases, he said. Industry in general should assume more responsibility for the health and safety of its employes away from the plant as well as at work. His paper concluded with a few general remarks and observations on business conditions and speculations on the future of some of present legislation. Most new federal labor laws are permanent legislation, and he believes that an entire new administration in Washington would not repeal many of them, if any. Employment is still the most important unsolved problem of the United States, and failure to solve it will threaten our constitutional system, said Mr. Ahearn.

Industry, he said, should recognize the new order and endeavor within the limits of decency to coöperate with all responsible efforts for the elimination of slums, for the wider distribution of goods, for improving living conditions for all, and for the creation of peace in this country.

He concluded by thanking the producers, at both meetings, for their interest and coöperation and expressed the hope that a large delegation from California will attend the national conventions to be held in St. Louis.

Cooling Cement

(Continued from page 26)

and the clinker is stored and reclaimed for grinding in straight tube mills without air separators. The maximum temperature of clinker introduced into the mills is about 190 deg. F. The mills are water-sprayed and the average temperature of the standard cement is 200 to 225 deg. F. when entering the finished cement screw conveyor.

Cement Cooler Efficiency

A typical tabulation of cement temperatures before the cement entered the cooler and at the stockhouse is as follows:

To the cooler deg. F.	At the bins deg. F.
205	150
200	155
205	160
197	132
200	156
210	162
200	160

Before entering the cooler, the average temperature was 203 deg. F. and at the bins it was 154 deg. F., or a net drop of 49 deg. While readings were being taken, 1850 bbl. of cement were placed in one bin in 10½ hr. or 175 bbl. per hr. About 130 bbl. per hr. was put through the cooler and the remainder by-passed, with the cooled cement stream joining the remainder in the screw conveyor. The cooling water, at 80 to 90 deg. F., was heated 25 to 28 deg. F. In manufacturing high early strength cement, the higher temperature of the cement entering the cooler is offset by requiring the passage of considerably less material so the final temperature of the cement entering the bins is about the same as that for standard cement. About 160 deg. F. is considered a favorable cement temperature for handling in the hot months.

To Make Cement From Oil-Shale Coke

CEMENT is to be manufactured at a new plant in Wurttemburg, Germany, using oil-shale coke. The new plant will produce oil-shale coke and then process the material with limestone into a special high-grade cement said to have unusual qualities of bending strength and impact resistance. Shale oil and the sulphur constituents will be by-products of this plant.

Stockpile Obsolescence

By ELWOOD T. NETTLETON

ARTICLE SIX

On crushing, sizing, testing and specifying aggregates covers the problem of obsolescence of material in stockpiles caused by changes in grading specifications

For reasons already discussed it is quite necessary for each and every commercial producer to stock-pile material from time to time. The amount of material in stock at any time, or the amount of material which goes in and out of stock and which is subjected to extra handling costs, breakage, segregation, becoming dirty in stock is of interest to all aggregates producers. Furthermore, the annual fear that part or all of this material might become obsolete by changes in specifications is still more important.

The amount of material shipped in 1937 by the New Haven Trap Rock Co. was as follows:

	Tons	%
Gross total loaded from bins	618,250	77.5
Gross total loaded from storage	179,077	22.5
Total shipments	797,327	100

Inasmuch as the difference in inventory (see accompanying table), as of January 8, 1938, and January 7, 1937, was 10,276 tons the total tonnage which went from bins to storage was 179,077 tons plus 10,276, or 189,353 tons into storage.

Should specifications be changed so that part or all of this material becomes obsolete, the cost to any producer would be overwhelming. In the case of the New Haven Trap Rock Co. this would amount to the large sum of $180,000. Naturally, no company can stand a yearly loss of this much, nor a small fraction of this cost, without eventually placing the cost back on the consumer.

With the New Haven Trap Rock Co. doing approximately 750,000 tons of business a year this would amount to 24 cents per ton increase in price for every ton sold to take care of obsolescence. This method would be the conservative way, as the specifications might be changed next year.

Usually there would be some salvage value to this material, which might be dumped on the market, where specifications were not too rigid, for perhaps 50 percent value. Furthermore, it is not expected that the specifications would be changed to such an extent that all sizes would become obsolete, although it is a possibility which engineers should remember. Should only one intermediate screen be changed, this would affect two sizes of stone, affecting one size on the lower limit, and the next smaller size stone on the upper limit. As a result any one change would make two sizes obsolete.

(To be continued)

TONNAGE OF MATERIAL IN STOCK AT ALL QUARRIES

(Inventory of Stone in Stock as of Jan. 7, 1937)

	Middlefield	Rocky Hill	Plainville	Granby	Cheshire	North Branford	Total	Selling Price Per Ton	Cash Value
2 Mx'd	6,404	1,300	2,440	0	36	0	10,180	$0.90	$ 9,162.00
2	3,295	0	6,378	670	655	7,891	18,889	.90	17,000.10
1½						12,017	12,017	.90	10,815.30
1¼	890	9,140	7,356	572	4,770		22,728	.90	20,455.20
1						3,195	3,195	.90	2,875.50
¾	11,987	4,650	20,576	474	86	2,030	39,803	1.00	39,803.00
½	13,937	0	9,382	0	2,130	457	25,906	1.15	29,791.90
¼	0							1.75	
Scrng.	20,000*	284	15,000*	0	9,665	35,000*	79,949	.60	47,969.40
	36,513	15,090	46,132	1,716	7,677	25,590	132,718 Without Scrng.		129,903.00
	56,513	15,374	61,132	1,716	17,342	60,590	212,667 With Scrng.		177,872.40

(Inventory of Stone in Stock as of Jan. 8, 1938)

	Middlefield	Rocky Hill	Plainville	Granby	Cheshire	North Branford	Total	Selling Price Per Ton	Cash Value
2 Mx'd	2,174	500	3,595	0	1,586	6,776	14,631	$0.90	$ 13,167.90
2	3,935	9,120	8,416	630	199	21,438	43,738	.90	39,364.20
1½						11,431	11,431	.90	10,287.90
1¼	1,246	6,160	5,224	501	715		13,846	.90	12,461.40
1						6,776	6,776	.90	6,098.40
¾	5,749	4,012	12,277	50	1,031	954	24,073	1.00	24,073.00
½	5,173	317	9,931	0	527	4,772	20,720	1.15	23,828.00
¼	10						10	1.75	17.50
Scrng.	25,000*	2,177	15,000*	0	9,960	35,581	87,718	.60	52,630.80
	18,287	20,109	39,443	1,181	4,058	52,147	135,225 Without Scrng.		129,298.30
	43,287	22,286	54,443	1,181	14,018	87,728	222,943 With Scrng.		181,929.10

Value of stone and screenings in stock Jan. 7, 1937, $177,872. Value of stone and screenings in stock, Jan. 8, 1938, $181,929.

Washing–Classifying Sand

Part 5.—Methods and simple laboratory equipment required to compute falling rates of sands with tabulations and curves developed from tests

By EDMUND SHAW

JOHN PRINCE of the Stewart Sand and Material Co., Kansas City, Mo., made tests on the falling rates of sand grains from the Kansas and Missouri Rivers, and these have been plotted and compared with the fall of the fastest grains as observed by Richards (Fig. 1).

The appearance of the curves indicated that the falling rates of the grains were governed by the same laws. The rise in the curve at (a) Fig. 1 is a feature of curves of this kind for crushed grains which the writer has noted before, and it is seen in some plots of Richards' observations (Figs. 2 and 3). Allowing for this, the correspondence is close enough so that it was probable that only the constants in the formulas already given need be changed. And working by simple proportion, the following formulas were found.

For ⅜-in. to No. 6 grains,

$$v = 145\ D(s-1)^{\frac{1}{2}}$$

For No. 8 to No. 48 grains,

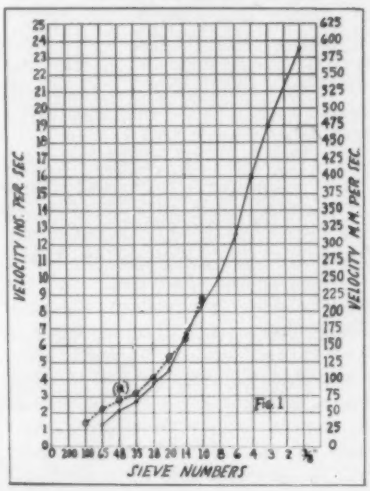
$$v = 135\ D^{0.83}$$

For No. 48 to No. 200 grains,

$$v = 575\ D^2\ (s-1)$$

The table and the plot made from the velocities calculated by these formulas and the velocities observed by Prince show a very close correspondence, so close that there can be no doubt but that the formulas may be used with sands of this type.

Fig. 1: Comparison of falling rate of river sand grains with Richard's fastest (quartz) grains. The rise in the curve at (a) is characteristic of crushed quartz grain curves



Shape of Grains

Weymouth, in his paper on the mortar-making characteristics of sands, found in A.S.T.M. Proceedings,

CALCULATED AND OBSERVED VELOCITIES OF RIVER SAND

Sieve No.	Dia. of Grain in mm.	Calculated Velocity* mm./sec.	Calculated Velocity ins./sec.	Observed Velocity mm./sec.	Observed Velocity ins./sec.
⅜-in.	9.42	640	25.6	587	23.5
No. 4	4.69	400	16.0	400	16.0
No. 6	3.33	388	13.5	342	13.7
No. 8	2.36	256	10.2	250	10.0
No. 10	1.65	215	8.6	215	8.6
No. 14	1.17	156	6.1	167	6.7
No. 20	.83	116	4.6	120	4.8
No. 28	.59	86	3.5	98	3.9
No. 35	.42	65	2.6	70	2.8
No. 48	.29	50	2.0	53	2.1
No. 65	.21	39	1.6	33	1.3
No. 100	.15	22	0.9	—	—
No. 200	.074	15	0.6	—	—

1938, shows that the shape of the grain must be taken into account in designing mortar and concrete mixes. Recently he called the writer's attention to the fact that the sub-angular grains found in the Los Angeles area, had greater volumes than the grains of corresponding screen sizes from rounded glacial sands. Hence, they weigh more per unit of measurement, for the same grading. On the other hand, we all know that flattish grains have a lesser volume and weight than either the spherical or the angular grains.

These shape variations have a large effect on the velocities of their fall. Richards studied this and allowed for it by giving the constant K in his general formula. $v = K(D(s-1))^{\frac{1}{2}}$, three different values. For average grains $K = 2.44$; for rounded grains, $K = 2.73$; and for flattish grains, $K = 1.92$. (The values of v and D are in meters in the original equation.) If the velocity of the average grain from these formulas is taken as 100%, the velocity of the flattish grain will be 79% and of the rounded grain 123%.

Surface texture is another factor affecting fall, the smooth surface grains falling with less friction than the grains with rough surfaces.

Porosity will lighten the weight of the grain, and if it includes pitting it will also give the grain a rough surface; both effects will lessen the falling rate.

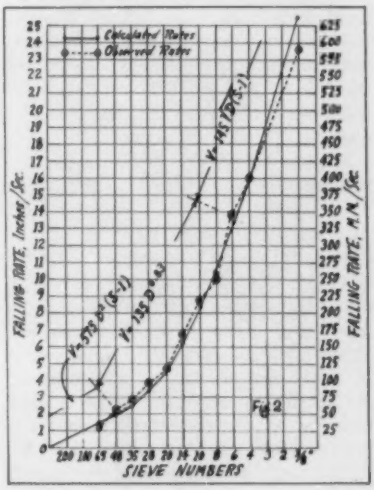
Magnetic minerals sometimes are found to interfere with settling by forming clots that settle very rapidly.

Allowing for Factors That Affect Falling Rate

There is a considerable range of specific gravities in the minerals which are treated in the rock products industries, but nothing like the range of the minerals treated in ore dressing, which includes all specific gravities between 1.55 (coal) and 7.5 (galena). The lowest specific gravity the writer met with in his work with rock products was 2.55, a natural sand; and the highest was 3.00, trap rock.

The effect of such differences may be found from the formulas that have been discussed. Quartz, or silica, has a specific gravity of 2.64, and

Fig. 2: Curve of falling rates of natural sand calculated and observed



*Formulas, ⅜" — No. 6, $v=145\sqrt{D(s-1)}$; No. 8-No. 48, $=v135\ D^{0.83}$; No. 65-No. 200, $v=575\ D^2\ (s-1)$.

trap rock, one of 3.00. Substituting these for s and s_1 in the formulas,

$$V : V_1 :: K\sqrt{D\ (2.63 - 1)} : K\sqrt{D\ (3.00 - 1)}$$

and solving this we find that $V : V_1 :: 1.28 : 1.41$, or as $1.00 : 1.10$. Which is the same as saying that grains of trap rock will fall 10% faster than grains of quartz of the same size and shape.

Apparently there is no way to allow for the shape of grain except by finding what it is by experiment. In the case of galena and quartz, the ratio computed as above should be as 1 is to 2. Experiments have shown that the real ratio for a 1 mm. grain is 3.75, according to Richards. The difference is mainly due to the shape of the grain, for galena breaks into small cubes that fall much faster than the angular grains into which quartz breaks.

Use of Falling Rate Tube

It would be difficult to make a set of tables that would include all the minerals met with in the rock products industry, with their variations in shape of grain and other characteristics. For this reason it is better to determine the actual rates of fall with a falling rate tube.

This is merely a long glass tube, long enough and large enough so that the free fall of the grains may be observed through a sufficient distance. One tube which the writer had for some years was 5 ft. long and 1-in. outside diameter. It was purchased from a chemical supply house, and cost about one dollar. The ends were fitted with rubber stoppers and two rubber bands were placed approximately a foot from each end, so they were exactly 3 ft. apart. This distance was checked occasionally to make sure the bands had not slipped.

To use such a tube, the sample of sand should first be sieved through the testing screens, and all the products should be laid out on small squares of paper, each marked with the screen sizes, as "Between No. 14 and No. 20."

A stopper is put in one end and the tube is stood upright and filled with water. Then a few grains of the size to be tested must be put in the water, and the other stopper inserted. The tube should be completly filled with water and the stopper put in gently, so that no air bubbles will be formed. A stop watch is necessary to take the times of falling, if the fall of the larger grains is to be accurately recorded, but for grains finer than 20-mesh an ordinary watch with a second hand will do. It is much better to have an assistant to take the time.

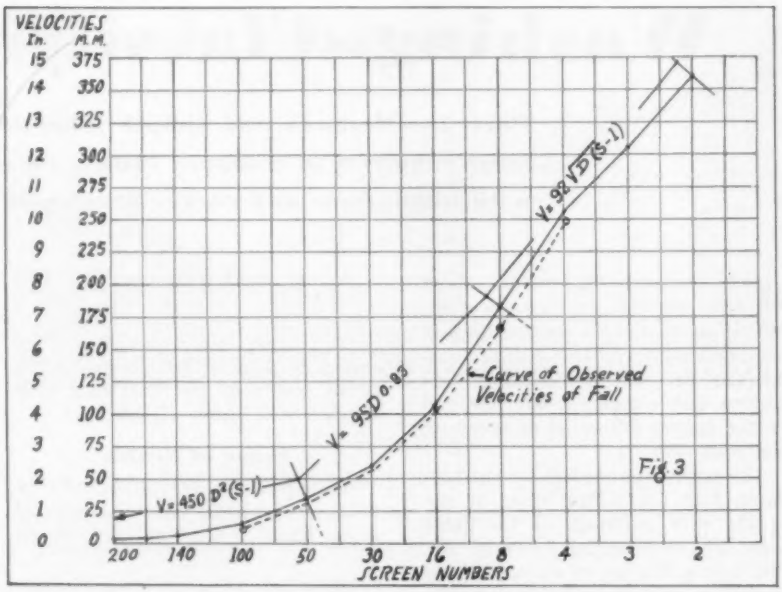


Fig. 3: Comparison of velocities found by formulas and observed velocities of falling grains of crushed quartz

After both stoppers are in, the tube is held until the grains have fallen to the bottom, except a few flat scales, perhaps. Then it is inverted quickly. The grains will fall, and it is assumed that they will be falling at a uniform rate when they pass the first rubber band.

As they fall the grains divide into three classes, a few fast grains that fall ahead of the mass, the mass of grains falling at about the same rate and the flat scaley grains that drag along behind. It is the fall of the center of the mass of grains that is to be recorded, and the observer should call "time" when it passes the first rubber band and again "time" when it passes the second. Since the bands are 3 ft. apart, the falling rate in inches/second, is 36 divided by the time in seconds it took the mass of grains to pass from one band to the other.

The essential thing about this work is not to use so many grains that the tube is crowded. It is the free settling rate that is wanted, and if there are too many grains they will interfere with one another. Each grain makes little eddy currents as it falls, and the eddy currents from one grain should not affect another. For 20-mesh grains about twenty grains is right, less for coarser sizes and more for finer sizes, if desired. For 4-mesh grains and coarser, individual grains should be timed. They may be dropped into the open tube with a pair of tweezers.

The rates of fall of the grains should be plotted, and it is well to have a plot of silica grains or natural sand grains on the sheet for comparison. If the curves are not alike the work should be repeated in the part of the curve where the difference is greatest. A curve of theoretical falling rates, worked out from the formulas given here makes an excellent curve for comparison.

A 500 cc., or 1000 cc. graduated cylinder, such as is in common use in laboratories, is sometimes used to determine falling rates. A rubber band is placed a few inches below the top and another a short distance from the bottom, and the distance between them should be an exact number of inches.

A few grains are taken on the point of a pen knife and placed in the water with as little disturbance as possible. The timing is the same with the long tube. While the long tube gives more accurate results, especially on coarse grains, good results may be obtained from the other.

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For those who may be new readers of ROCK PRODUCTS and wish to review the entire series of articles by Mr. Shaw, the May, 1939 issue contained the first article which dealt with the Theory and Practices of Washing. Succeeding articles in June, July and August described and illustrated various methods and equipment of washing and classifying sand. In articles to appear later, the most efficient uses of various modern machinery will be described and illustrated.

Cut Silica Handling Cost

Sluice and pump sand from deposit to plant and reclaim from storage by slackline cableway. Drier permits year-round operation.

By RALPH S. TORGERSON

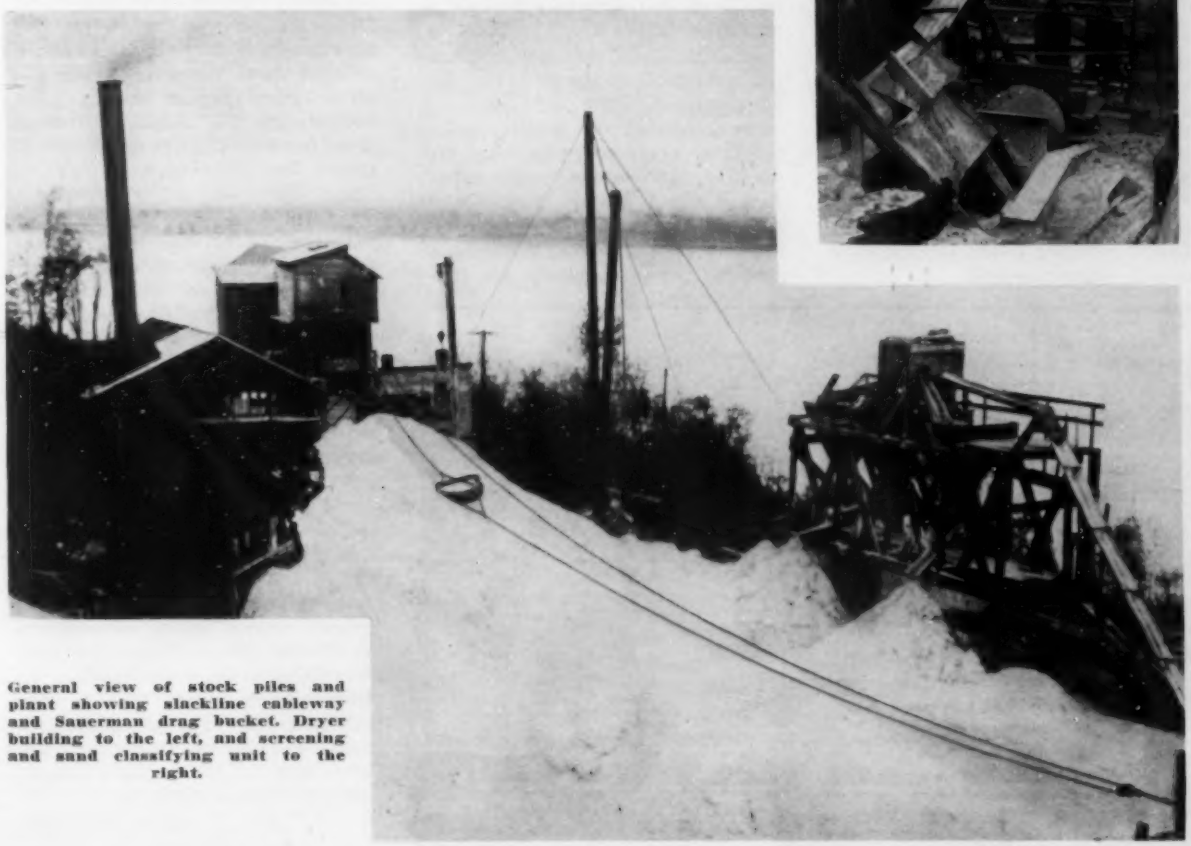
TO PERMIT operation of the Langworthy Silica Co. plant near Clayton, Iowa, without the difficulties usually encountered in the winter several important changes were made, including the installation of a drier having a maximum capacity of about 12 tons per hr. Prior to these changes, the sand after being washed, was loaded into cars while still wet. This made it practically impossible to carry on any extensive winter operations. In the accompanying sketch and photographic illustrations may be seen the present method of producing silica products under all-year conditions of operation.

The deposit, which is 125 ft. high, is a consolidated sandstone of St. Peter formation with an overburden consisting of a mixture of clay and Galena limestone which varies from 2 to 40 ft. deep. This has been stripped off by means of a 1½-cu. yd. Sauerman Crescent drag scraper and a Bucyrus-Erie Type B shovel. Drilling is done with an Ingersoll-Rand jackhammer. The holes are drilled to a depth of 14 ft. and the shots vary in size according to conditions, some having 30 holes and others, 6 to 10. Blasts are set off with an electric battery.

Rotary Screen Acts As A Tube Mill

Sand is now sluiced from the deposit and flumed to a rotary screen acting as a tube mill, where all oversized lumps are worn down to the size of the ⅝-in. perforations and pass through. The sand is discharged to a sump where it is picked up by two Nye vacuum pumps. These pumps carry the sand to a screen mounted in a box above the three cone classifiers or washers shown in one of the illustrations. Before going into the classifiers or washers, the sand is screened again and any lumps are returned in a chute to the rotary screen and the roll crusher located to the rear of the screen.

Right: Rotary screen used as a tube mill in breaking up lumps. Rejects are sent to roll crusher and fines are pumped to screening plant



General view of stock piles and plant showing slackline cableway and Sauerman drag bucket. Dryer building to the left, and screening and sand classifying unit to the right.

Undesirable material with the overflow from the Allen cone classifiers is flumed to waste, and the finished sand is discharged at the bottom into the stockpile. The 1½-cu. yd. Sauerman Crescent drag bucket, formerly used in the pit, is now set up as a permanent installation to drag the sand up to a hopper near the building housing the 5- x 40-ft. Tyler rotary oil-burning drier to which it is elevated by means of a drag conveyor and elevator. The damp sand or that which is not kiln dried is loaded into cars with a clam shell bucket attached to the stiff leg derrick shown in one of the illustrations. Shipments by railroad are made via C. M. & St. P. R. R., from a siding alongside the classifiers and the building housing the drier.

Storage and Reclaiming

With the present arrangement, the steam-operated Stroudsberg hoist and scraper installation is permanently located near the plant for storing and reclaiming the finished sand from the stockpile and is not moved in from the pit in the fall and returned in the spring. For winter operations, a reserve of material is built up in the stockpile at the plant and with the aid of the drier, sand may be loaded out in the winter without trouble.

Foundries are the chief customers of the Langworthy Silica Co. The sand is used also by contractors to give a white finish on plaster walls and by marble cutters and polishers. It is also said to be suitable for glass making purposes and for use as a filter sand.

Officers of the company are: John G. Chalmers, president; Harvey M. Lange, secretary-treasurer; and Ward Straitt, superintendent.

How Much Does It Cost?

(Continued from page 24)

general books as any other material, so what this amounts to is that this balance is a warehouse item in addition to the actual amount of dynamite on hand at the end of the month, and it represents the stone which has been blasted in the quarry but not yet removed. The figure charged into costs each month is obtained by multiplying the number of tons removed from the quarry and put into the crusher by the cents per ton it cost for dynamite and supplies during the previous year to blast stone ready for loading into trucks. This current charge out figure is entered in the essential materials column as per exhibit 5.

It is fairly easy to keep a check on this figure since the number of tons in each primary blast is figured very closely, and after the number of tons moved out of the quarry to the crusher is obtained the number of tons remaining in the quarry can be estimated. If this figure is too low or too high it will appear in a very short time by multiplying the number of tons remaining in the quarry by the figure being used, and this should check with the balance being carried. The form used in keeping a record of this dynamite balance is shown by exhibit 4.

After the daily summary of material removed from the warehouse has been received at the plant office, the items are posted to a monthly material sheet as shown by exhibit 5 and the total shown by the warehouseman gives a check against any error in addition or the loss of any orders.

The warehouse orders for material used for brick production are handled the same as the crushed stone plant items but are listed separately by the warehouseman on his daily summary sheet. The brick items are then posted to a brick material work sheet as shown by exhibit 6.

Pricing Warehouse Orders

All items of material amounting to over $50.00 are charged out at invoice value plus the actual transportation charges, and all items amounting to less than this figure are charged out at invoice value plus 5% to cover lossage and transportation charges.

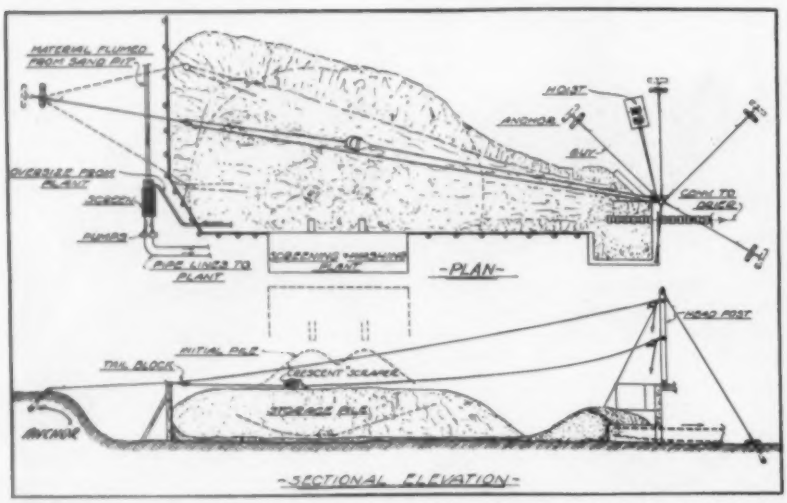
A physical inventory of material in the warehouse is taken each six months and, after checking the total of this inventory with the total of the general books controlling figure, if it is found that the warehouse is running short or long the 5% addition mentioned above is raised or lowered to a figure which will cause the warehouse to come out approximately even over the next period. A 10% addition was used for several years but efforts to keep a closer check have resulted in lowering this to 5% where it has remained for the past several years.

Freight and express charges are paid weekly. The original paid bills are posted to a summary sheet, as shown by exhibit 7, and filed on the back of this summary sheet (one for each month) and, of course, give the supporting data for checks issued covering them. These freight and express figures appear in the costs through the 5% addition to small items mentioned above and in actual amounts on large items.

Figuring Material Costs

At the end of each month, after the material work sheets have been balanced and totaled, the figures are then posted to cost sheets consisting of 14-column pads as shown by exhibits 8 and 9. The number of tons produced or the number of brick produced that month is added at the top of the column containing that month's figures, and the cost per unit is figured for that month by dividing the amount in each account by the number of units produced. This cents-per-unit figure is entered just in front of the amount in red pencil figures. The amounts entered for each current month are added to the previous months during that year and entered in the next column to the right and the cost per unit to date that year can then be figured for comparison purposes. The figures are then ready for the monthly reports which will be discussed later.

(To be continued)



Plan and elevation of silica screening and washing plant and stockpile area, showing method of reclaiming and storing

New Clinker Cooler Installation Improves Product

Air quenching type cooler improves clinker grindability, decreases autoclave expansion, reduces fuel consumption, and simplifies quarrying operations

By BROR NORDBERG

SEVERAL TYPES of air quenching coolers, some integral with the kiln and others separate, have been described in recent issues of ROCK PRODUCTS. All of them have demonstrated good efficiencies in the recovery of heat. Some, by themselves or by addition of after-coolers, have increased grindability by virtue of the ultimate low discharge temperature. Manufacturers of portland cement by these changes have reduced autoclave expansions and maintained them at a *constant* low level. The extent to which the expansions are reduced depend, of course, upon the chemical analysis and the character of the raw mix and its uniformity.

In a recent issue of ROCK PRODUCTS,[1] the inclined-grate clinker cooler developed by the Fuller Co. and operating at the Valley Forge Cement Co. plant at West Conshohocken, Penn., was described. At that time operating data were meager but the mechanical construction and method of operation were discussed in some detail. The arrangement consisted of a primary, or air-quenching cooler, to perform the job of producing a high percentage of glass, followed by an independent and similar secondary cooler, which serves to cool the clinker down to temperatures favorable for grinding.

Operation of the Cooler for Maximum Efficiency

More recently, inclined grate coolers have gone into operation at Keystone Portland Cement Co's. plant at Bath, Penn., and some data is now available on their performance. This installation was made to reduce and hold constant the autoclave expansion. These expansions had been held down to reasonable figures, in the neighborhood of one percent, prior to installation of the coolers, but to do so required considerable manipulation of the raw mix and judicious selection of the raw materials. In other words, quarrying was selective and costly compared to an orderly working of any quarry face.

Keystone operates a wet process plant and has four 10- x 13- x 12- x 250-ft. Polysius Solo kilns. Two of these kilns are now equipped with Fuller air-quenching coolers, installed somewhat differently than the Valley Forge coolers because of small space requirements and the job for which they were intended.

The cooler consists of reciprocating and stationary grates which cause the clinker to assume a uniformly thin inclined bed in the direction of the discharge end. All but the driving mechanism is housed in a brick chamber which is located below the kiln. The clinker coming from the kiln drops through a vertical chute and is distributed upon the grates and moved at a uniform rate to the low end. Fixed grates alternate with the reciprocating and both types are water-cooled by tubes around which each grate casting is poured. A single drive shaft is driven through a speed reducer by a variable speed motor, the speed controlling the depth of the clinker bed and its rate of movement through the cooler.

Cooling air enters the cooler by way of an air chamber and is forced through the clinker bed, both through spaces between the grates and through flared openings in each grate, thus subjecting the clinker particles to horizontal and vertical air blasts as they descend from grate to grate. The theory of the design is to provide long paths of air travel in contact with clinker particles for a maximum heat transfer with relation to volume of air. (Details of this type of cooler installation were shown in the illustration in ROCK PRODUCTS, August, 1939, p. 59.)

Coolers Combined Recuperator and Final Cooling Type

Coolers in the Keystone plant differ from the earlier installation in that they are of the combined recuperator and final cooling type with a divided chamber, and are placed at right angles to the kilns in a

[1] Rock Products, September, 1938, p. 43.

Below: View of kiln hood, showing coal feed apparatus. This kiln has been equipped with the clinker cooler located below floor level in a limited space

One of the kiln hoods rebuilt with installation of new Fuller clinker cooler. Note air intake fan on left and duct leading to inclined grate

tunnel of very limited area. Each unit is 20 ft. long, and the kilns are set on 26-ft. centers. Each grate surface has an area of 80 sq. ft. and operates with a steady power input of ¾ to 1-hp. This cooling surface takes care of a kiln output of 1750 bbl. per day.

Originally each 250-ft. kiln had an enlarged burning zone 35 ft. in length followed by a 26 ft. length of cooling zone, which was very satisfactory as a heat recuperator and produced a clinker of about 675 deg. F. The burner pipe was 27 ft. long and air-cooled, with a 3-ft. tip of heat-resistant metal.

Changes in Firing Zone

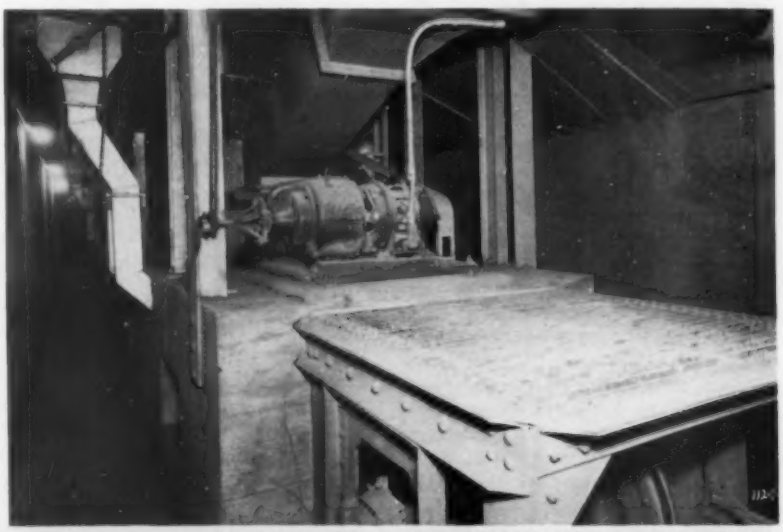
The firing zone has been converted into an extension to the calcining zone, and is lined with 40 percent alumina brick, and the cooling zone is now the firing zone lined with 50 percent alumina brick. Combustion has been accelerated and burning is completed very close to the point of discharge of the clinker to prevent delay in cooling and to allow a sudden drop in clinker temperatures. The burner pipe, which extends just 3 ft. inside the kiln hood, is water-cooled and firing is done with a much shorter, hotter flame.

Air for quenching is forced through the hottest clinker at the upper end of the cooler, and the preheated air enters the kiln around the burner pipe as the secondary air for combustion. Additional air is forced through the secondary portion of the grate to reduce the final clinker temperature to about 350 deg. F. as compared to 675 deg. F. from the cooler which has been displaced. This is a sufficient reduction for efficient grinding since the clinker is re-handled and stored sufficiently for its temperature to drop between 100 deg. F. and 200 deg. F. before grinding. Clinker averages about 2400 deg. F. when it hits the grate.

Other test data were compiled at the time these temperature readings were taken. The clinker bed averaged about 8 in. to 9 in. depth and the stack gas analysis was about the same as before the new coolers were installed. Exit stack temperatures were 650 to 700 deg. F., which also remained about constant. Primary air, taken from the tunnel below the kilns, entered the kiln with the pulverized coal at about 89 deg. F. and at the rate of about 4000 c.f.m. while about 16,300 c.f.m. was put through the cooler-quencher and preheated to about 970 deg. F. before entering the kiln. About 9300 c.f.m. of air was put through the secondary part of the cooler and exhausted to the atmosphere at about 350 deg. F. This represents about 61,000 B.t.u. per minute or about 4½ lb. of coal of the grade used.

A definite decrease in coal consumption per barrel has been observed, although accurate figures are as yet unavailable. Autoclave expansions are being held to about 0.25 percent, using the standard mix of feed which had to be altered before in order to hold expansions down. The effect has been to allow use of materials in the quarry which formerly were abandoned in favor of other strata.

Above: Drive end of new clinker cooler. Below: Discharge end of cooler, showing how it fits into small tunnel area



Electron Diffraction Research

New research methods, using electron diffraction and reflectivity, and their application to investigations in the field of rock products

By LEWIS B. MILLER*

IN CERTAIN RESEARCH PROJECTS upon which our laboratory has been engaged, it was found desirable to investigate some of the newer physical and physico-chemical methods of research. The possibilities of application of one or two of these methods to problems in the field of rock products appear to be so great that it is desired to call attention to the methods and to suggest a few applications.

Electron diffraction methods of investigation have been made use of in the study of metals and metallic coatings and also in the study of organic films with success. The method was developed mainly by Prof. G. P. Thompson about 1927.[1] In many respects it is similar to X-ray methods but differs in certain important characteristics. Electron diffraction methods make use of the pattern or spectrum produced when a beam of electrons is impinged upon or passed through the material under investigation. The spectrum or pattern obtained may be studied through the use of a fluorescent screen or a photographic plate. The spectrum for each substance is characteristic (within limits) as is the case with X-rays. Electron diffraction methods differ from those of X-rays in a number of ways; a few of the more important ways are given here.

Advantages of Electron Diffraction Methods

Whereas X-ray diffraction methods are primarily applicable to the study of crystalline solids and in a limited way to liquids, electron diffraction methods can be applied not only to the study of solids but to liquids and vapors as well. Whereas it ordinarily requires many hours to obtain a satisfactory diffraction pattern upon a photographic plate with X-rays, satisfactory plates can be obtained by electron diffraction within time limits of a fraction of a second to a few seconds. The "electron waves" made use of in electron diffraction methods are roughly of the order of 1/100th of the wave length of X-rays so that crystalline structures of such fineness that they appear amorphous with X-rays are quite capable of yielding a diffraction pattern by electron diffraction methods.

In addition, X-rays because of their great penetrative power are not readily applicable to the study of thin films on surfaces. Electrons on the contrary are only slightly penetrating. For transmission studies, exceedingly thin films must be made use of. Because electrons are readily reflected through small angles from smooth surfaces, it is possible to study films on the surfaces of solid objects where such films are of such thinness that they vary from one molecule to a few tens of molecules deep.[5-6] Obviously these differences in the characteristics of the diffraction of electron beams and X-ray beams permit the use of the electron diffraction method in the investigation and solution of problems where X-ray methods are wholly inapplicable.

CHEMIST'S CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.

Equipment and Methods

A description of equipment and methods for using electron diffraction may be found in a number of places.[2, 3, 4, 7]

The electron diffraction method has been used to advantage in the investigation of the "Beilby layer," the thin layer of amorphous metal which Beilby believed was formed on the surface of a polished (but not etched) metal specimen when it is ground and polished[8, 9, 10]; in the study of thin layers of metal such as electro deposited and sputtered metallic films[4]; and to the study of thin films of organic compounds[11]. Work along the latter line is now being conducted in several places upon thin films of organic compounds and their method of functioning when used as lubricants.

Application to Investigations of Cement Clinker

In the investigation of inorganic, non-metallic substances at the present time by means of X-rays it is common practice to use the "powder" method. This requires that a sample of some size be pulverized and the resulting powder be subjected to X-ray diffraction. The resulting diffraction pattern is thus a composite of the patterns of all the crystalline constituents present in sufficient amount to yield a pattern. In the case of portland cement clinker or of the hydration products of cement, such crystalline products are numerous. With X-rays there appears to be little hope of examining and obtaining patterns of minute, selected portions of a piece of clinker. With the electron diffraction method this condition may be met within certain limits. With electron diffraction methods the area of a thin film usually examined by transmission or the area of a surface examined by reflection is of the order of 0.01 square millimeter with existing equipment. To what smaller area examination can be limited with satisfactory results has never been determined, probably because in the problems investigated there was no need for the examination of exceedingly minute areas. No doubt the electron diffraction apparatus can be considerably improved in this respect.

Investigations along this line upon portland cement clinker might be very productive of results. In examining thin sections of cement clinker, the writer has sometimes noted areas of tricalcium silicate and of beta dicalcium silicate which were of the order of .01 sq. mm. in area. It appears probable therefore that even with present type electron diffraction apparatus it would be possible to examine a thin section of port-

*Chemical Engineer, Keasbey & Mattison Co., Ambler, Penn.

land cement clinker (if properly mounted) or preferably a polished section and be able to obtain electron diffraction patterns of these major constituents, one at a time. Whether the beam could be reduced in size so as to pick out some of the individual minor constituents individually, remains to be seen. Since "electron beams enable us to detect the presence of crystallites which are only a few tens of atoms across"[12] it would seem possible that the electron diffraction method would permit the presence of minor constituents to be qualitatively determined. Moreover, electron diffraction methods as applied to metallic specimens appear to be quite sensitive to the formation of metallic compounds, alloys, etc. Arguing an equal sensitivity for the method as applied to cement clinker, this method might offer a means of solving the much argued questions regarding the extent of solid solution occurring between some of the major constituents of portland cement clinker. It may well be that electron diffraction methods will bring out new facts not indicated by either optical or X-ray methods.

The electron diffraction method has also been found very satisfactory for examining thin films on solid objects such as the oxide films which form slowly on polished metal specimens[4]. It might similarly offer a method for investigating the hydration reactions of portland cement by permitting a thin section or polished section to hydrate in appropriate environment under controlled conditions and then to examine the film of hydration products by electron diffraction. Because of the speed with which photographic plates may be exposed in electron diffraction apparatus, repeated and rapid exposures might yield information regarding the mechanisms of the reactions of hydration particularly in the early periods of hydration which are difficult to investigate by ordinary chemical methods.

In the above paragraphs portland cement clinker has been used as an example of a material which might be advantageously investigated by electron diffraction methods. Portland cement has been selected merely because the writer has had experience in that field. The same line of thought applies to many other "rock products" problems.

The electron diffraction method has been applied to the study of minor constituents and their effect in certain metallic bodies with advantage. Thus in one case[4] it was found that when the smooth interior surface of a cast iron cylinder from an internal combustion engine was subjected to friction and then examined the surface yielded, not the expected iron pattern, but a partially oriented graphite pattern, indicating that the carbon in the cast iron was brought to the surface by friction where it became oriented to act as a lubricant.

The nature of the grain boundaries in iron[13] have been examined by dissolving out the major constituent (iron) with an appropriate solvent and examining the residue remaining in the electron diffraction apparatus. Identification was made of the presence of two compounds among the minor constituents,—Fe_3C and alpha Fe OOH.

These two references are cited as examples where, with ingenuity, the investigators were able to determine important facts regarding minor constituents by means of electron diffraction methods.

Studies of Catalysis

The electron diffraction method because of its usefulness in the investigation of surfaces is also finding application in the study of the mechanism of heterogeneous catalysis and in the development of catalytic agents.

In investigations on non-metallic materials involving optical methods, particularly the petrographic microscope, the specimens are usually made up either in powder form, as thin sections or as polished specimens. In the latter two cases grinding and polishing methods are employed for preparing the specimen. It is important, therefore, for the investigator in the field of rock products to know something of what occurs when a sample of either metallic or non-metallic material is thus prepared. Investigations into the mechanics of grinding and polishing were made many years ago, using optical methods for following the progress of grinding and polishing[8, 14]. More recently electron diffraction methods have been used to supplement microscopic methods for studying the mechanics of grinding and polishing[9, 15], with the general result that the older theory of Beilby in regards to the polishing of metals has been discarded. Because the theory of the mechanics of grinding and polishing is so closely associated with investigations involving the application of some of the newer research methods, as well as the more time honored optical methods, the subject has been included here and some of the more instructive references cited.

Another comparatively new method of investigation, which is said to be finding application in exact determinations of the transition point of metals, is based upon the reflectivity of the metals. The method was apparently first proposed in 1920 by Sharp and Little.[17] Search has been made to discover whether this method has also been applied to the investigation of phase changes in non-metallic materials with negative results. The method may have possibilities, if applied in research problems upon non-metallic materials, particularly because of the minute quantity of material required for a determination.

Attention has here been called in some detail to the electron diffraction method and to some of its possibilities, if applied to research investigations in the general field of rock products. Mention has also been made of investigations which have been reported on the subject of the effect of grinding and polishing upon test pieces used in connection with the application of electron diffraction methods as well as optical methods. Attention is also directed to a method, perhaps not yet fully developed, involving the principle of reflectivity which may offer possibilities in connection with phase rule investigations upon non-metallic substances.

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Calcining, Hydrating Lime

Part 4. Five improved designs of shaft kilns for the production of lime, operating procedure and advantages of each type described in this month's Lime Forum

By VICTOR J. AZBE*

IN A CERTAIN eastern plant, also calcining dolomite, with coal being burned over hand-fired grates, the furnace temperatures in a series of seven kilns taken one after the other were 2600, 2360, 2500, 2260, 2720, and 2480 deg. F. All are too high and some extremely so and this, in spite of the fact that the Eldred process was in operation and that CO_2 in the ash pits ranged from 5% to 9%.

Of course, they could have increased the CO_2 and brought temperatures down, but if only that is done, capacity and ratio are lowered. With everything remaining the same; that is, stone size, gas velocity, size of hot zone; a lowering of temperature by 200 deg. F. doubles the time of calcination; but if stone is reduced to half the size, capacity is more than brought back again.

Recirculation of kiln gases will serve the purpose of temperature regulation very well, but recirculating gases should be high in CO_2 and as hot as possible. Conditions often prevent making ideal installations and a compromise is necessary. The series of illustrations here presented evolve from a satisfactory minimum to the ideal system.

Fig. 5 shows both the induced draft connection as well as a CO_2 offtake on a kiln with a storage zone. The recirculating gas pipe opening being lower than the outlets for the main kiln stream, results in preventing the high leakage air from the charging door diluting the CO_2 as well as lowering its temperature.

Storage zones on kilns are upsetting and it is always best not to have them, but then the kiln must be charged after every draw.

At times that is only partly possible, as some storage is needed and it is then when the system in Fig. 5 fits in particularly well. Although the zone is expanded, the center offtake draws the gases through the middle where the stone flows the fastest.

Natural Gas Kilns

Fig. 6 represents a modern natural gas kiln with submerged offtake and center burner. As natural gas ordinarily is available at a considerable pressure, fans for gas recirculation are necessary and arrangements can be made so that natural gas itself creates the suction necessary to bring the tempering gas from the kiln top.

However, it is extremely desirable to have the recirculating gas as hot as possible and then use a great deal of it. If tempering gas would be drawn off from the top of the hot zone at 1600 deg. F. and reinjected at that temperature into the bottom of the hot zone, no heat would be lost and still the high temperatures would be tempered. Under this system it would not be harmful if a great deal of gas would be recirculated, in fact, the more the better, as then the gas velocity in the hot zone would be higher and heat transfer greater. The desirable state of affairs would be: a quite large amount of gas recirculated that would be heated up by injection of some fuel for which the necessary air had come up through the cooler pre-heated.

A considerable problem is presented in propelling hot gases. Special high temperature fans are available but they are expensive; however, when natural gas is available its energy of compression can be utilized to create an injector effect and Fig. 7 shows such an arrangement.

When producer gas is the fuel, the hot gases must be recirculated by some other means, probably a fan. A better and simpler way is through the medium of an injector just like in the case of natural gas, but in this case the propelling medium is fairly high pressure air. To obtain air at 12 in. or so is an easy matter and air at this pressure would, in a properly designed system, handle so much hot gas it is unlikely that the gas would be cooled more than 200 deg.

If very much of the gas were drawn off through the kiln walls as shown in Fig. 7, there may be considerable channelling up the wall, which may cause trouble. Fig. 8 is an arrangement for producer gas; an elaboration of a design by means of which gas is obtained uniformly from the kiln. The hollowed arch sprung across makes this possible. The arch would be of refractory material and non-clogging. Since the

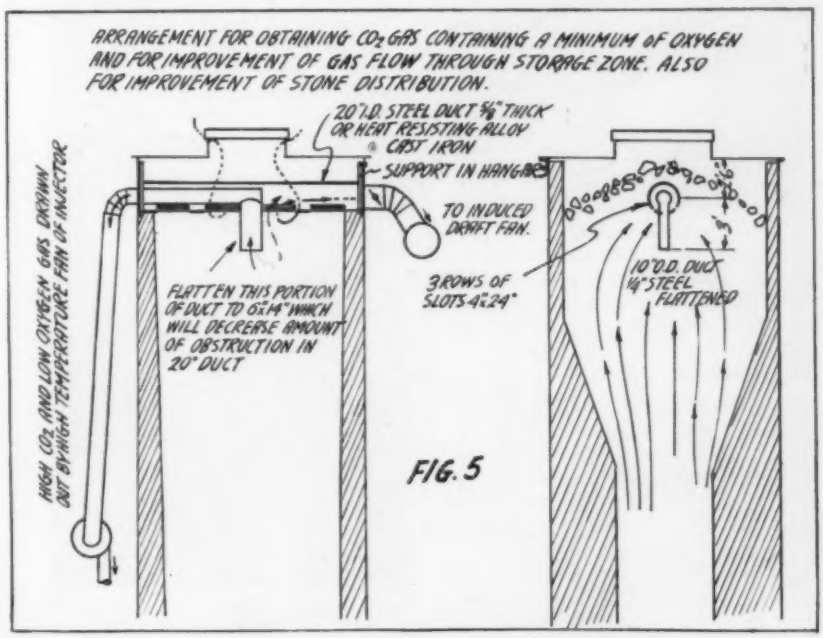


FIG. 5

*From a paper presented before the recent Lime Symposium in Columbus, Ohio, held under the auspices of the A.S.T.M.

center burner, of which many are now used, stands temperatures and abuse well, this offtake arch should stand it even better, as it seldom would be exposed to heat higher than 2000 deg. F.

Fig. 9 shows the final and best system of the series. It comprises: a storage zone with submerged offtake for kiln gases, and a system for CO_2 for the gas producer; a hot gas recirculating system in connection with a center burner; primary air through the cooler and some secondary air over the center burner. This scheme may be further revised by using CO_2 from the hot gas offtake for the gas producer, in which case, the producer would be blown with an air-CO_2 mixture of 400 deg. F. which was tried and worked quite well, but for the present that would carry the complications too far.

Properly Tempered Kilns

Proper temperature conditioning of kilns helps beyond just soft burning of lime. If done to a proper degree, all slagging of the walls stops immediately; also the temperature through the hot zone is equalized and hot channels are broken up.

High temperature overburns the outside of the lump, which creates a tendency to shrink and not being able to shrink, due to the softer burned lime underneath still holding its original shape, there is much breakage and considerable fines in the lime drawn. Then in the kiln, these fines obstruct proper gas distribution and proper air passage up through the cooler. Some core definitely is due to fines, preventing access of hot gases to the calcining lime. Finally, in the case of tempered kilns, the trimming on a hang is much simpler and better.

Fuel Conservation Improvements for Rotary Lime Kilns

SOME INTERESTING STUDIES of rotary lime kiln performances have been made in England with the object of improving fuel efficiencies. T. Andrews of Edgar Allen & Co., Ltd., describes in *Cement, Lime & Gravel*, London, March, 1939, a new preheater designed with this objective, and gives an interesting analysis of the calcining process and a summary of the heat balance for burning lime.

He points out that fuel is required for the following stages when calcining limestone: (1) Stone is heated from atmospheric temperature to 212 deg. F. (2) Water is evaporated. (3) Steam is superheated to the temperature of the waste gases. (4) Stone is heated from 212 deg. to 1650 deg. F, the temperature of dissociation of calcium carbonate. (5) Calcium carbonate is dissociated, or the carbon dioxide separated from the calcium carbonate. (6) For complete dissociation, the temperature of the stone is raised to about 2300 deg. F. The specific heat of limestone for temperatures up to 212 deg. F. is generally taken at 0.22. For the evaporation of one pound of water at atmospheric pressure, 966 B.t.u. are required. Dissociation of calcium carbonate is effected at the expense of 772 B.t.u. per lb. The percentage of $CaCO_3$ varies, of course, with every limestone.

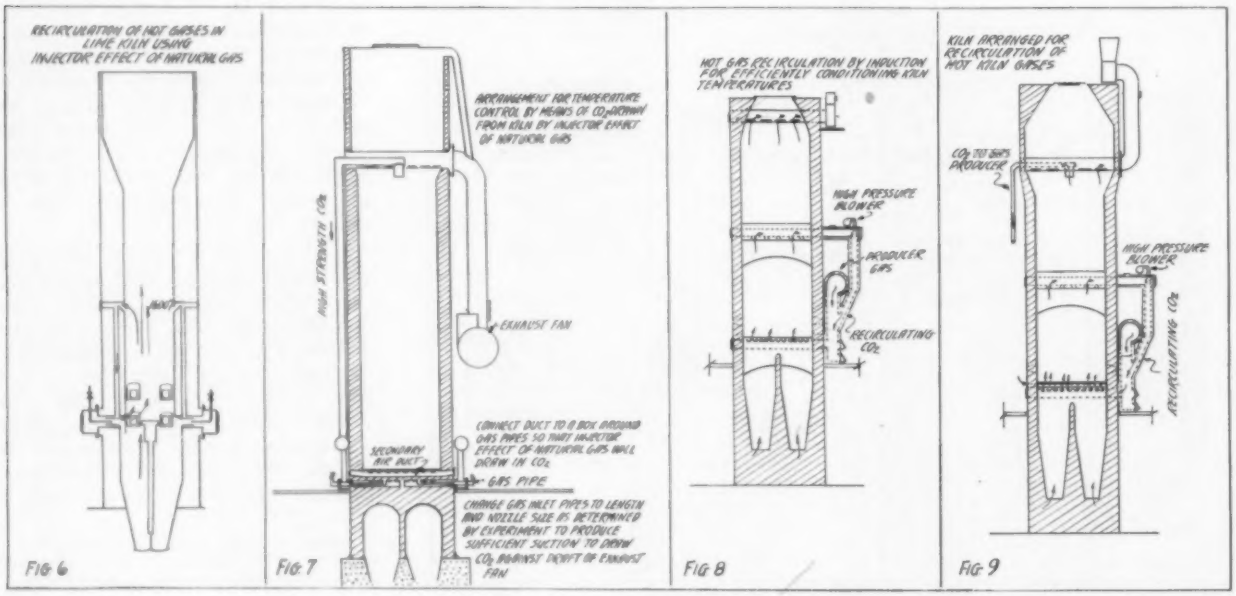
Heat losses may be determined as follows: It will be found that the shell temperature of a rotary lime kiln is about 475 deg. to 500 deg. F. at the hottest zone and decreases to about 150 deg. F. at the upper end, corresponding to a heat loss of about 1700 B.t.u. to 175 B.t.u. per square foot of shell per hour. This heat loss may be reduced by fitting an insulation lining between the refractory bricks and the kiln tube, which reduces the shell temperature to about 210 deg. or 220 deg. F. at the hottest zone and 100 deg. to 120 deg. F. at the upper end.

The temperature of the combustion gases in the hottest zone of the kiln is somewhat higher than that of the material, 2300 deg. to 2400 deg. F. Heat is gradually transferred to the material and the gases thereby cooled, but from a moderate sized kiln they will leave at a temperature of about 850 deg. F. Heat contained in these gases will depend on the chemical composition, but it is approximately 180 to 190 B.t.u. per lb. of gas.

Heat Balance Summary of Rotary Kiln

It was previously stated that for complete dissociation, it is necessary to raise the temperature of the stone to about 2300 deg. F. If the heat contained in the stone could all be recovered the gain would be 2300 deg. — 60 deg. $\times$ 0.23 = 515 B.t.u. per lb. Although this is not economically possible, some of the heat may be recovered by bringing the secondary air for combustion in contact with the hot lime by means of

(Continued on page 67)



NEWS ABOUT PEOPLE

BEN W. CALVIN has been elected president of the Aetna Portland Cement Co., Bay City, Mich., to succeed the late Franklin R. Johnson. Mr. Calvin was vice-president and general manager of the company from 1937 and had been sales manager from 1933 until 1937.

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EDWARD J. SCHERER, Sandusky, Ohio and LLOYD N. BEUTHEL, Buffalo, N. Y., will take over the duties of the late Fred W. Ohlemacher, manager of the Sandusky department of the Kelley Island Lime and Transport Co. Scherer will be superintendent of the Sandusky division in charge of dock and boat operations, and Beuthel will be sales manager of the division. Scherer assisted Ohlemacher in many of his duties and was cashier for many years.

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H. J. KAISER, JR., heads the new Permanente Cement Corp., Los Altos, Calif.; Harry Davis is general superintendent; Sydney Taylor, construction superintendent; S. J. Davis, assistant general superintendent; Bill Brayton, excavation superintendent; Don Brown, office manager; and Harry James, purchasing agent.

S. J. (Mickey) Davis, assistant general superintendent, was formerly superintendent of aggregates plants and concrete mixer plant at Grand Coulee Dam. He will also serve as general superintendent of the Columbia Construction Co.'s sand and gravel plant (see p. 74).

S. J. (Mickey) Davis on the job, wearing steel helmet

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M. S. LAMBERT has become associated with the Hewitt Rubber Co., Pittsburgh, Penn., as vice-president and general manager. He had been with Robins Conveying Belt Co. for years. Mr. Lambert is a director of the Manufacturers' Division of the National Sand and Gravel Association and the National Crushed Stone Association.

M. S. Lambert

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E. M. TURNER, engineer connected with the Tennessee State Highway Department, has resigned to become Louisana representative of the Portland Cement Association. He has been in the service of the State for 20 years; was named chief engineer early in 1937 and was named engineer of planning and surveys in the Spring of this year.

HERBERT A. SNOW, president and general manager of the Portland Cement Company of Utah, Salt Lake City, Utah, is a candidate for mayor of Salt Lake City in the primary election to be held this fall. At present he is president of the Chamber of Commerce and a member of both the State Board of Correction and the State Adult Probation and Parole Board.

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JOHN G. MUNSON, formerly president of Michigan Limestone & Chemical Co., has been elected vice-president in charge of raw materials of the United States Steel Corp. He succeeds Thomas Moses, who retired at the age of 80. Mr. Munson joined the United States Steel Corp. subsidiaries in 1919 as operating manager of Michigan Limestone & Chemical Co. He was elected vice-president in 1925 and became president and director in 1928.

John G. Munson

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THOMAS PANTON, director and secretary of Goodwin, Barsby & Co., Ltd., Leicester, England, recently visited the office of ROCK PRODUCTS. He is touring this country and is interested in American developments in road, quarry, and gravel machinery

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F. P. "BUD" SPRATLEN, president, Spratlen-Brannan, Inc., Denver, Colo., was a guest and active participant at the recent meetings of West Coast aggregates and ready-mixed concrete producers in San Francisco and Los Angeles, Calif.

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CHARLES COBB has been promoted to the managership of the Sherman Concrete Tile Co.'s plants at Jacksonville and Tampa, Fla.

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(The obituaries appear on page 73)

Hints and Helps

★ FOR SUPERINTENDENTS ★

Improvised Temporary Tag Line

By ROSS WHEELTON

ON SEVERAL OCCASIONS at our quarry the tag line from the clamshell bucket to the counterweight traveler in the crane boom breaks at a time

Emergency arrangement used when tag line cable breaks

when a replacement cable is not immediately available.

If the crane must continue to operate, we take the short cable and pass it through the single block on the boom and hang a weight to the end. This holds the bucket straight and prevents the cables from twisting.

Transferring Rock From Trucks To Quarry Cars

By JOHN F. ROBINSON
Supt., Cedar Bluff Quarry

TWO V-8 FORD DUMP TRUCKS with high tailgates were purchased by the Cedar Bluff Quarry, Princeton, Ky., for use in stripping with a steam shovel. When they came, we were not ready to strip and decided to use them for various rock-moving jobs in the main quarry. This meant transferring the stone from the trucks to our 1½-cu. yd. Western side-dump, all-steel cars, because our incline is entirely too long and steep to move the rock directly to the primary crusher by truck. The accompanying illustration shows the transfer system.

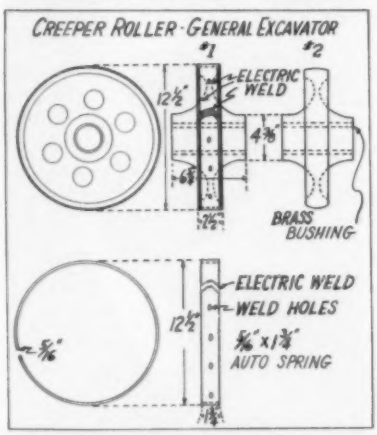
Ramp constructed to permit dumping into rail type quarry cars

It has been entirely successful and the trucks have proved very valuable in gathering rip-rap, cleaning out small quantities of dirt from inaccessible places, stripping "heels" in front of shots before drilling, and cleaning the quarry floor of debris.

Building Up Creeper Roller on Crane

By CLARK H. WRIGHT
Snyder, N. Y.

CREEPER ROLLERS and plates wear quite rapidly under certain conditions where it is necessary to move crane from one stockpile to another.



Building up worn creeper rollers and plates by welding

Where there is excessive wear, it is possible to build up the diameter of the rollers and also the tumbler wheels on the front end of the creepers.

In doing this weld job, take any automobile spring that measures 1¾ in. wide and 5/16 in. thick, bend to the shape of the creeper roller, and burn holes in the spring about 4½ in. apart and about ¾ in. in diameter so that the springs can be welded onto roller through these holes. Where the ends of the spring join together leave a gap about ⅜ in. apart and shape them as shown in the illustration. Then weld a double bead around both sides, making sure to clean off all foreign matter before starting on the second bead.

It is not necessary to make this band all in one piece; it can be in several pieces, but care must be taken in doing this work. The bands must fit the roller as tightly as possible before starting to weld, otherwise they will spring and probably break the weld or the spring. It is best to use a clamp to hold the band on to the roller before starting to weld. About 260 amperes and about 40 volts should be carried by the electric welding machine. Fig. 1 shows the roller after welding is completed. Fig. 2 shows the roller before band is welded on.

Less than an hour is required to complete the bending and welding of the automobile spring on the creeper rollers. The same method is used on the tumbler wheels, but when doing this work care must be exercised not to build the tumbler wheel out of proportion to the size of the small creeper roller wheels.

Lazy Man's Rock Shaker

By JOHN R. MARCY

A ROCK SHAKER which has decided advantages over the usual type of hand shaker has recently been developed by E. L. Seitz, resident engineer, District 7, California Division of Highways. Its novel feature is in the base, which is constructed of two 18-in. discs, salvaged from a pavement planner. The lower disc, concave side down, serves as a base upon which the upper disc, concave side up, can be rotated in any direction.

The two discs are held in position by a bolt passing through the centers. A discarded valve compression spring placed over the upper end of the bolt provides tension adjustment for limiting the rocking motion.

Testing screen for field or laboratory

The nest of screens, of conventional type, is held in place by four 1-in. tubes welded to the upper disc and braced by a ⅜-in. rod connecting them at about 6 in. above the disc.

A rotary motion of 50-60 r.p.m. gives a gently rolling action across the screens which quickly and easily assorts the rock. The double rocker permits the shaker to be set up and operated on rocky or sandy ground, and it can be easily moved from job to job.

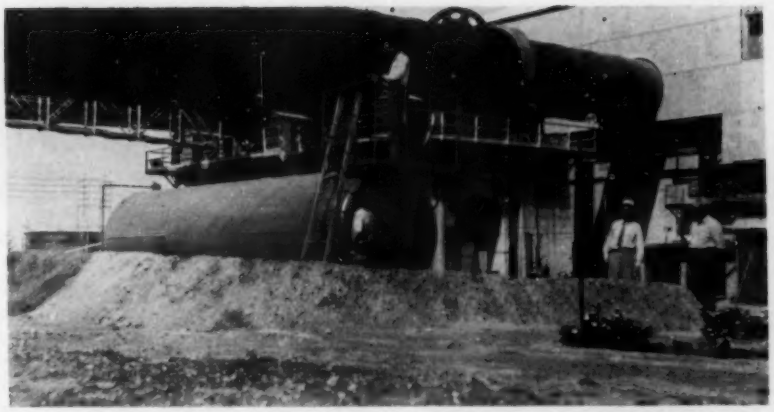
The screen is adaptable for use in the laboratory, field, or any place where the determination of size proportions is necessary, and the idea can easily be adapted to hand screening of any kind.

Pumping Oil Direct from Boats

SEVERAL YEARS AGO a cement company which was built near a harbor on the Atlantic Coast changed from coal to oil firing of kilns. A very economical and convenient method of obtaining oil directly from the tanker was arranged, and an 80,000 bbl. oil tank was set up to supply the kilns. The oil is pumped from the boat through a 10-in. pipe line.

From the storage tank, a 6-in. underground line carries the oil to a centrally located pumping station. This pumping station consists of one Snow and two Gardner 6- x 4- x 6-in. pumps which are interchangeable. Valves make it possible for any one of the units to pump from the storage tank or to pump to the 5000-gal. preheating tank. Usually two pumps are in operation, one pumping from the storage to a preheating tank and the other pumping to the next preheating tank.

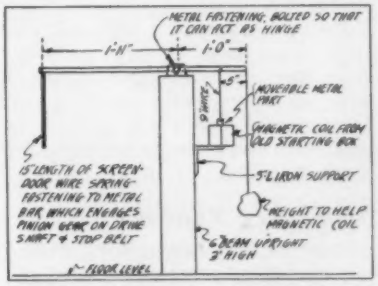
Steam heating coils, located at the bottom of the tank, heat the oil to a temperature of 200 degrees. It is then pumped through a 600-gal. preheating tank and then to a third tank of 600-gal. capacity. The same pressure forces the oil through these two tanks and up through a 2½-in. pipe to the kilns at 250 deg.



Fuel oil preheating tank which feeds to kilns. In the rear, left, can be seen the oil storage tank

Magnetic Coil-Operated Conveyor Brake

AT A LARGE SAND and gravel plant in Michigan, a magnetic coil-operated brake was installed at the head end of a 36-in. conveyor belt, 150-ft. centers, which carried the material from the unloading hopper to the dry screening plant.

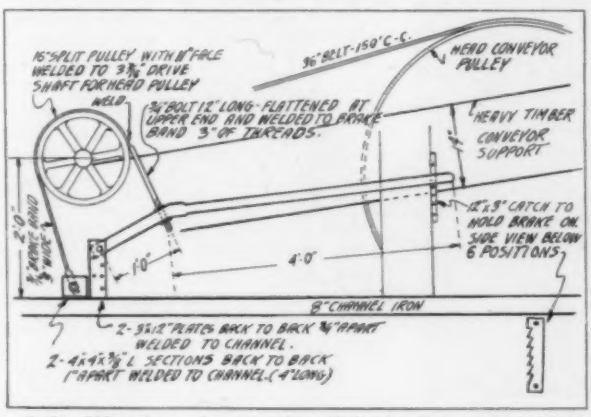


Showing connections of magnetic coil wires and counter-weight

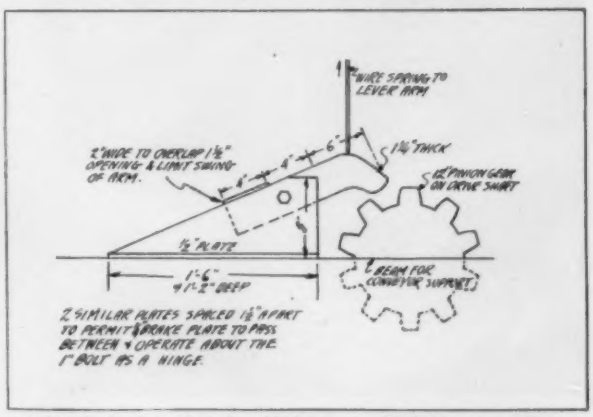
A ½-in. metal plate, 18-in. x 14-in., was placed on one of the main beam supports near the pinion gear on the drive shaft. As shown in the illustration, a swinging arm brake plate was installed so that when its curved end is in the down position it meshes with the pinion gear and stops the conveyor at once. In the up position, the gear runs clear. The bolt fastening the arm to two similar plates acts as a hinge.

Fastened to the brake arm is a 15-in. length of screen door spring, the top end of which is connected to a steel lever arm 35 in. long. A magnetic coil taken from an old switch box is connected to the lever arm and to the switchboard. When a fuse blows, magnetism disappears and the lever arm goes up on its right end, the brake arm engages with the pinion and the brake is set.

When the conveyor starts up, the iron in the coil is pulled down and the lever arm raises the brake arm from the pinion and the conveyor is free to move. Weights are hung from the lever arm, as indicated in the drawing, to assist the magnet to pull up the brake arm. The screen door spring is used so that in case the brake arm should not release immediately, it will spring up automatically when disengaged.



Left: Side view of magnetic-coil brake for conveyor belt



Right: End view showing brake arm which engages pinion

NEW MACHINERY * NEW EQUIPMENT

Crusher With Relief Valve to Pass Tramp Iron

ALLIS - CHALMERS MANUFACTURING Co., Milwaukee, Wis., has brought out a new gyratory reduction crusher known as Type R. If a piece of tramp

Gyratory type crusher designed so that setting may be changed quickly

iron should get into the crushing chamber, a relief valve opens and the head and shaft lower sufficiently to pass the foreign substance. The crusher discharge opening can be quickly restored by cutting the feed (to clear crushing chamber) and raising the head, all of which may be done without stopping operation of the crusher.

Crusher setting can be changed quickly. This is made possible by a built-in, oil-filled hydraulic jack supporting the thrust bearing which holds the shaft, with mantle, in crushing position. Head and shaft can be raised or lowered by injection or release of oil.

Wearing parts of this crusher consist of a ground manganese steel mantle and a one-piece self-tightening concave ring, both of which are said to be of non-choking, uniform wear design, enabling the production of fine stone. Dust is excluded from wearing parts by means of a specially designed, patented, rubber-curtain dust and oil seal.

The spider and top shell are cast integral and can be readily removed to replace the one-piece concave ring, which is ground outside and is self-tightening. The hub is fitted with an oil seal to prevent loss of lubricating oil. To permit free discharge of crushed material and prevent obstruction, the bottom shell is of open construction without a diaphragm.

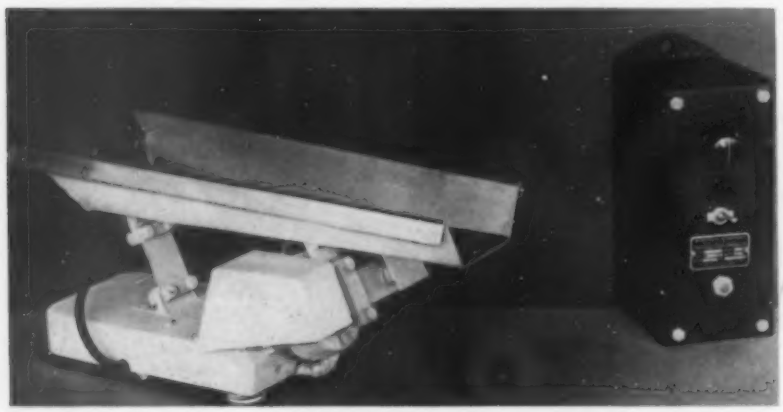
Hourly capacities at different settings range from 20 tons at ¼-in., close side discharge opening, to 33 tons at ¾-in., with small throw eccentric for fine crushing, and 46 tons, with large throw eccentric for coarse crushing.

Vibratory Feeder

SYNTRON Co., Homer City, Penn., has announced a small model of vibratory feeder for controlling the flow of bulk solids, identified as Model F-O.

Rated at 2000 lb. per hour of 100-lb. material, such as sand, this size feeder is the smallest model in the line and is intended for small, finely controlled feeds of bulk solids down to a few pounds per hour.

The vibratory feeder is made up of a sheet metal trough 18 in. long by 3 in. wide, with tapered sides from rear to front, mounted on springs and actuated by a pulsating electromagnet. Control of the rate of flow is accomplished by regulating the vibratory action through a rheostat in the separate controller supplied with each feeder. The controller, which also contains the operating switch and a thermionic valve, is arranged for separate, remote wall mounting.



Vibrating feeder and controller for controlling the flow of bulk solids

Hoists Equipped With Explosion-Proof Motors

THE HARNISCHFEGER CORP., Milwaukee, Wis., has introduced explosive-proof electrical equipment for hoists.

Because electrical hoists have always been known as sources of hazardous sparking, their use in certain

All electrical equipment on hoist has been made explosion-proof

types of plants has been rather restricted. To eliminate any possible objection and to widen the field of hoist application, the explosion-proof electrical equipment was developed. Motors are rated at 30 minutes 55 deg. F., and the reversing starters, together with geared upper and lower limit switches and push-button stations, are explosion-proof. Wiring is in rigid conduit with explosion-proof fittings, and the electric brake is enclosed in a heavy cast iron cover which is bolted to the gear case cover. Further reducing the possibility of sparking, a flexible cable connection is used, together with spark-proof trolley wheels.

All equipment used bears the underwriter's approval for Class I, Group "D" hazardous location.

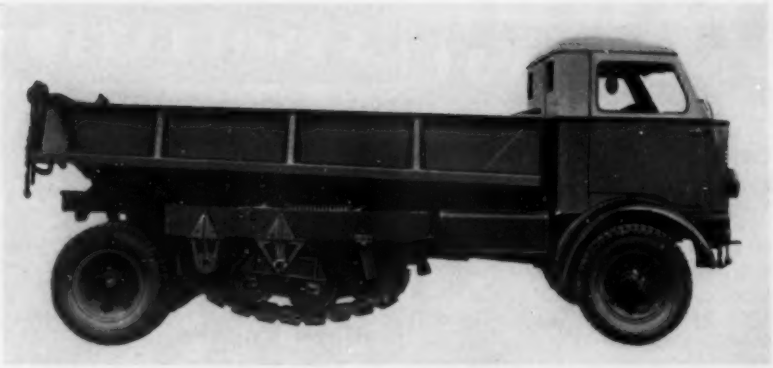
Combination Crawler and Wheel Type Truck

THE LINN MANUFACTURING CORP., Morris, N. Y., has developed a haulage unit, known as the Model C-5, which can be instantly converted from track to wheel operation, or vice versa, merely by throwing a control lever mounted at the driver's position. Body capacity is five tons, and the chassis weight, with cab, is 11,500 lbs. The engine is a 6-cylinder Hercules rated at 105 hp.

Operating on dual pneumatic tired wheels, the vehicle has seven inches of road clearance under the traction unit. In this position, the drive is on the front wheels; the traction unit idling, and merely revolving should it hit an obstruction. The load distribution is equal on front and rear wheels, with a maximum speed of 35 m.p.h.

When track operation is desired, the operator merely pushes the control lever and the rear wheels are raised hydraulically. The wheels can be raised to allow nine inches of road clearance, or they can be allowed to trail or float behind the traction unit. When the Model C-5 is operating on tracks, the load distribution is 75% on the tracks and 25% on the front wheels, with the drive on the tracks and front wheels simultaneously. Maximum speeds, loaded, on tracks is 12 m.p.h.

With either track or wheel operation available at the will of the driver, it is claimed that the C-5 will handle many types of hauling jobs which at present require auxiliary equipment or rehandling of the load. In hauling from pits, for example, the vehicle will come up out of the pit unaided with its own load, and on its own tracks; and when it reaches good road, it can roll away at high speeds on rubber. In addition, it will do those jobs requiring steady track operation, or others requiring only wheel operation. If hauling is to be over good roads for any protracted period, the entire traction unit is readily removed and stored.

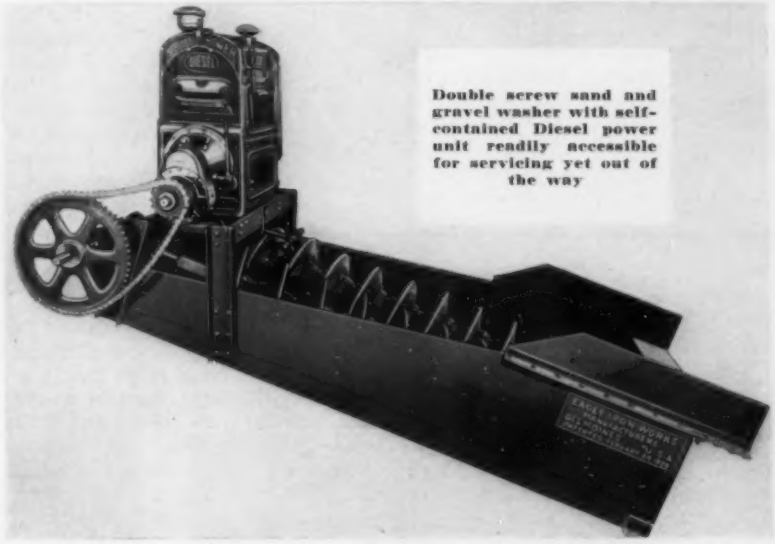


Rear wheels of combination wheel and crawler raised or lowered hydraulically

Diesel-powered Gravel Washer

EAGLE IRON WORKS, Des Moines, Iowa, has brought out a double screw sand and gravel washer with a self-contained Diesel power unit. It is a Hercules 4-cylinder Diesel power unit Model D00B, 3¾ in. bore by 4 in. stroke and is completely self contained.

The washer consists of two spiral screws each 12 ft. long. These screws draw the aggregates to the center of the tub and convey them upward to the discharge end. Wash water inlets are arranged along the tub between the two screws. Timken roller bearings carry the upper ends of the spiral screw shafts and cutless rubber bearings are used at the lower ends of the shafts which are subject to abrading action of the sand and water.



Double screw sand and gravel washer with self-contained Diesel power unit readily accessible for servicing yet out of the way

Hoist With Steel Housing Covering Moving Parts

CLYDE IRON WORKS, INC., Duluth, Minn., has designed a hoist with a steel housing that encloses all moving parts, preventing accidents and keeping cable from becoming entangled in the gears. All operating levers have been conveniently grouped to an adjustable operator's seat. Hydraulic band friction is said to result in effortless operation and greater efficiency. Grease-packed ball bearings, it is claimed, eliminate the necessity of lubricating the hoist.

Steel housing encloses moving parts of hoist mechanism

Impact Crusher

F. M. WELCH ENGINEERING SERVICE, Greenville, Ohio, has announced production of an impact crusher, a development of the Greenville soft stone eliminator. According to the announcement, the crusher has a capacity of 20 to 30 tons an hour, using from 7½ to 15 hp., depending on the character of the feed. It can be speeded up to make sand out of pea gravel, and it is said that the resulting product contains a large percent-200 mesh sand. The wearing part of the unit consists of replaceable manganese steel blades.

NATIONAL ASSOCIATION ACTIVITIES

Concrete Products Conventions

WASHINGTON, D. C., and the first or second week of February, 1940 will be the time and place of the next annual meetings of the National Concrete Masonry Association, National Cinder Concrete Products Association, and the Cast Stone Institute. There will be no exhibits in connection with the 1940 conventions. It has been decided to have an exposition of exhibits every other year. The decision to hold the conventions in Washington, D. C., will take the meetings to the Atlantic Coast where there has been a very active market for concrete products.

Ready Mixed Concrete

MEMBERS of the National Ready Mixed Concrete Association have received the "Proposed Tentative Standards and Recommended Practices for Truck Mixers and Agitators of Open-Top, Revolving Blade Type" for letter ballot. The final vote of the Standards Committee in favor of presenting the new standards to letter ballot the entire membership was six affirmative, one negative, and one failed to return ballot. The standards give definitions, capacities, mixing speeds, mixing time, time of hauling, protection, and water measurement.

Lime

SECRETARY BRUMBAUGH of the National Lime Association in his latest bulletin calls the attention of the membership to the preliminary report to Congress recently presented by the Temporary National Economic Committee. The committee gave support to and urged early enactment of a series of patent bills already introduced. These bills would limit the life of a patent to 20 years, create a single court of patents appeal, reduce the public use period from two to one year, reduce the period within which an applicant may copy claims for the purpose of asserting priority from two to one year. The Department of Justice also has recommended amendments to the patent law which would unconditionally outlaw any restrictions in respect to price, production, use or geographical area contained in any assignment, sale, or license of a patent, and would bar infringement of patent suits brought against licensees until successful action has been completed against the grantor. Violations of the amendment would be punished by confiscation of the patent by the federal government.

Road Builders

THE 1940 ROAD SHOW and Convention of the American Road Builders' Association will be held in Chicago's International Amphitheatre, January 29 to February 2, 1940, according to an announcement made by Charles M. Upham, engineer-director.

New York Crushed Stone

NEW YORK STATE CRUSHED STONE ASSOCIATION held a meeting on July 26 at the Syracuse Yacht Club, Syracuse, N. Y., with President H. E. Coleman presiding. Otho Graves reported on the Seasonal Exemption Hearing in Washington, D. C., and requested further coöperation of the members in filling out additional questionnaires. F. J. Buffington discussed the proposed code for control of dust, and E. T. Nettleton, secretary-engineering director, reported on the results of the questionnaire sent to the membership covering this code. The association went on record as commending F. C. Harrington, Administrator of the WPA, regarding his general letter No. 242 to all state works progress administrators, in which he definitely states as follows: "As a general policy, the production and manufacture of construction materials, such as stone, gravel, brick, concrete pipe, etc., on WPA projects should not be encouraged, since such work may compete with private industry and may tend to prevent private employment." It was voted that the secretary-engineering director continue to investigate those quarries which in his opinion both conflict with private enterprise and are contradictory to general letter No. 242.

Two new associate memberships were announced; namely, The Thew Shovel Co., represented by S. H. Shepard; and the Easton Car & Construction Co., represented by G. D. Fraunfelder.

The annual outing of the association will be held September 7 at the Schuyler Meadows Country Club, Loudonville, Albany, N. Y.

Chemical Exposition

GRAND CENTRAL PALACE, New York, N. Y., and the week of December 4 to 9, will be the time and place of the next annual Chemical Exposition. Up to date, 280 exhibitors have made contracts for space. Unit processes of chemical engineering will be represented by a broad range of exhibits. Combustion processes will feature furnaces, kilns, refractories, and the recording instruments essential for regulation and control. Crushing, grinding, and mechanical separation will be represented by sifters, agitators, classifiers, and ball mills. Classification of materials based on magnetic properties will also be featured.

Secondary Crushing

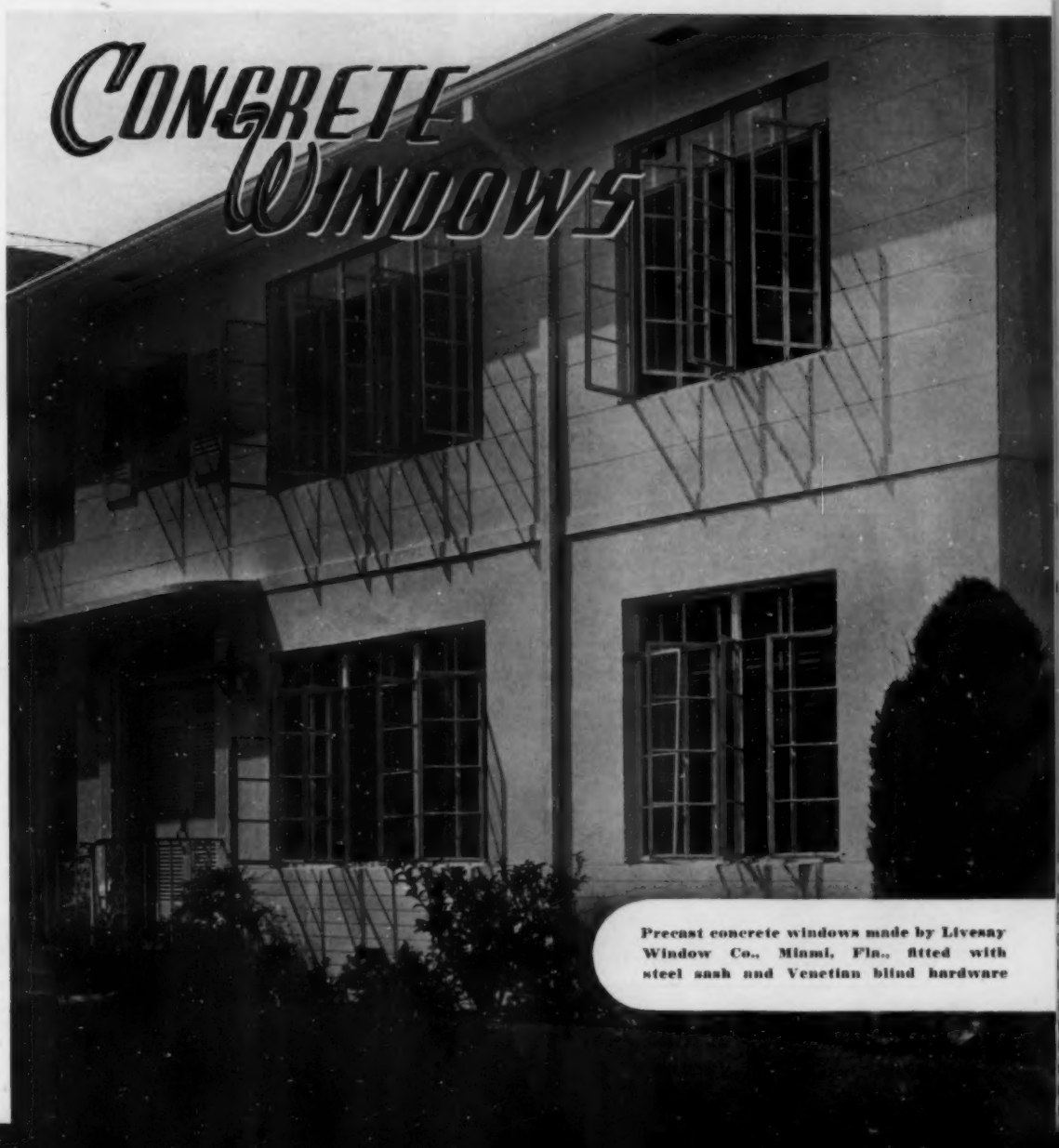
"FACTS you want about secondary crushing" is the title of a 16-page booklet which is being distributed by the Pioneer Engineering Works, Inc., Minneapolis, Minn. This interesting booklet describes the various types of crushers, their capacities and qualifications. Relative advantages of gear drive over chain drive, and discussion of the different types of shells and their maximum efficiency also are given in the booklet.

Correction

IN SECTION TWO of ROCK PRODUCTS for August, the insert reproducing in color the cement brands that are manufactured in the United States, under "Green Bag Cement Company, Pittsburgh, Penn.," the trade marks identified as 21-A, 21-B, 21-C, and 21-D belong to the Green Bag Cement Company of Pennsylvania, Pittsburgh, Penn., and those identified as 21-E, 21-F, 21-G and 21-H belong to the Green Bag Cement Company of West Virginia, Kenova, W. Va. The Green Bag Cement Company of West Virginia writes that it has no connection with the Green Bag Cement Company of Pennsylvania financially or otherwise and that it is the originator of the Green Bag package.

Peerless Cement Corporation, Detroit, Mich., also writes that the colors in which its trade marks are reproduced are not the same as they are on the bags of cement. They should be blue for the "Peerless Portland" brand, red for "Peerless Mortar" brand, and green for "Peerless High Early" brand.

CONCRETE PRODUCTS AND CEMENT PRODUCTS



Precast concrete windows made by Livesay Window Co., Miami, Fla., fitted with steel sash and Venetian blind hardware

Installation of Besser Automatic Vibrapac Plain Pallet Stripper in the plant of Bethayres Concrete Products Co., Bethayres, Pa. (Suburb of Philadelphia). This Vibrapac is fully automatic and makes three 8" blocks at-a-time on one plain pallet. Other sizes made from 2 to 24 at-a-time. Below, right, shows blocks being placed on racks with electric off-bearing hoist.

TAMPERS
BESSER PLAIN PALLET STRIPPERS
VIBRATORS

BESSER TAMPER STRIPPERS

Besser Super Automatic Plain Pallet Stripper — Daily Capacity 3000 to 4000

Besser Victory Automatic Plain Pallet Stripper — Daily Capacity 2000 to 2500

Besser Semi-Automatic Plain Pallet Stripper — Daily Capacity 1200 to 1500

Besser Champion Power Operated Plain Pallet Stripper — Daily Capacity 1000 to 1200

Besser Multi-Mold Hand Operated Plain Pallet Stripper — Daily Capacity 250 to 350

BESSER VIBRAPAC PLAIN PALLET STRIPPERS

Besser Automatic Vibrapac Plain Pallet Stripper — Daily Capacity 4000 to 5000

Besser Power Operated Vibrapac Plain Pallet Stripper — Daily Capacity 2000 to 2500

BESSER-FLAM VIBRATOR

Besser-Flam Plain Pallet Vibrator — Daily Capacity 800

West of Rockies address inquiries about this machine to:
STEPHEN FLAM, SHERMAN OAKS, CALIF.

Besser Vibrator Plain Pallet Strippers are being made under original patents on the plain pallet principle. Vibrator features are under Flam patents, which have a record of nine years' success in the manufacture of vibrated blocks, and under other patents with equally successful records in vibration of concrete. Other patents pending.

Ask for folder "21" Advantages of Plain Pallets. Write today for details and prices. State daily production and sizes you want.

BESSER MANUFACTURING COMPANY

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

209 39TH STREET — ALPENA, MICHIGAN

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Concrete Window Frames

Precast window frames, made in steel forms with concrete placed by vibration, eliminate difficulties of fitting sash and accessories

By BROR NORDBERG

PRECAST CONCRETE WINDOWS are rapidly becoming established in Miami, Fla., for use in home and apartment construction as products which have wide utility and a number of apparent advantages over older methods of construction. Their development was the outgrowth of E. G. Livesay's observations of the difficulties involved in installing Venetian blinds and steel sash in homes while selling these products. He conceived the idea of making a window which would positively eliminate difficulties in fitting these accessories, and the window bearing his name is the result.

John Lewis, president, on the right, and George Green, plant foreman, standing next to finished concrete windows

Improve Methods for Mass Production

The first concrete windows manufactured by the Livesay Window Co., Inc., were cast of concrete, hand-tamped into wooden and aluminum molds. As the market for precast windows developed, manufacturing methods were studied, and equipment and facilities were gradually introduced for larger scale production and for more variety in sizes and shapes. This study was concerned chiefly with methods of improving the concrete. Engineers of the H. C. Nutting Co., which operates enginering and inspection services in all principal cities, assisted in designing concrete mixes and developing the manufacturing procedure now in use.

Pressed steel molds, manufactured by the Thornton Co., Cleveland, Ohio, were then adopted as standard and a modern plant was engineered for casting windows by vibration. The inventory of molds now consists of 31 different sizes with which windows are manufactured to fit practically all specifications—some of the larger windows for apartments being multiples of smaller standard sizes.

Aside from the molds, the plant layout consists principally of storage facilities for aggregates, a 2-bag contractor's type concrete mixer, a vibrating machine and undercover storage space for "green" windows.

The vibrating machine is a simple horizontal table wide enough to accommodate the largest molds and supported at the four corners on steel spiral coils not unlike the conventional vibrating concrete joist machine. Off-center shafts transfer the needed vibration to the table top at controlled frequency and amplitude. Located directly in front of the concrete mixer, the top of the table is flush with the main plant concrete floor so that molds may be transferred to and from the table on cars fitted with rollers.

Concrete mixes are designed to produce concrete testing 500 p. s. i. at 28 days, and the proportions of aggregate are 260 lb. ½-in. minus stone and 260 lb. masons' sand (minus 8-mesh) to a sack of standard portland cement. To each batch is added 5 gal. of mixing water to give a semi-dry consistency.

Reinforcing

To add strength to the window, and to the structure into which it is fitted, each window is designed and reinforced as a continuous concrete span. No. 8 galvanized iron wire is inserted in the mold for the smaller windows and ¼-in. wire in the larger molds, 3 in. up from the bottom of the mold and 3 in. down from the top of the mold as it rests horizontally on the table. Normal window thicknesses are 9 in., designed for that standard width of sill and lintel.

Concrete is placed into the molds by hand shovels and the table is vibrated at three levels of the concrete in the molds—the entire operation requiring about two minutes. After casting, the wheel-mounted mold is removed to the storage section of the building to be stripped three hours later. All windows are spray cured and held a minimum of 28 days before shipment. About one hour after pouring, the top side of the concrete (front) is roughed to provide a bond for stucco if that is the type of finish for the building exterior—or a flat finish is applied to the face if trim is desired around the window opening.

Setting up the forms involves the placement of brass tubing for Venetian blind guides, which are cast

Large stock of concrete windows which will be fitted with steel sash at the plant

in the reveals of the jambs, and threaded brass inserts for attachment of the blinds. Brass tubing is also inserted for the steel sash. Usual procedure is for the steel sash to be delivered to the plant, where a special department is set aside for its installation in the window. Steel casements are bedded in plastic caulking compound, set over a saddle ⅞-in. high, and fastened by electro-galvanized screws which pass through the steel sash into brass inserts, which have been cast into the concrete frame.

Installing Concrete Windows

In setting up the windows where a stucco outside finish is specified, the roughened face of the window is set flush with the outside masonry wall (most new homes in Miami are masonry) and the inside face of the frame projects past the block wall the thickness of the furring strip. Special slanting sills are sometimes cast on the frames, on order, for fast drainage. When trim is wanted around the window opening, the float-finished frame is projected through the outside wall and the stucco is finished against the side of the frame. Stucco on masonry is also practically standard for modern home construction in Miami.

Having set the frame, the inside is flush with the inside of the wall, the furring strip overlaps the frame, and wire lath is nailed on from the frame over the rock lath. Plaster may be finished flush with the inside of the frame or a reveal may be made around the opening. A corner window consists of two frames, each cut back at a 45 deg. angle on the corner. The corner column is a 1¼-in. sq. bar, which is doweled and cast in one window frame. The other frame is cast to fit around the column to maintain watertightness.

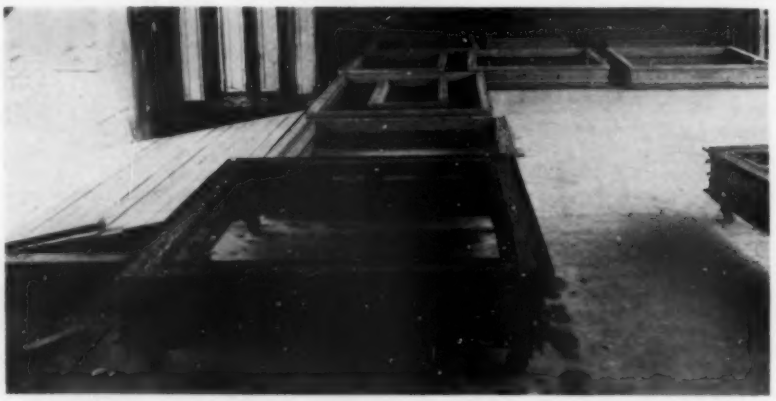
Advantages claimed for the Livesay windows are as follows: (1) Beam bottom is in lintel form; (2) Concrete sill; (3) Wood bucks or steel fins; (4) Venetian blind guides; (5) Furring and Venetian blind guide backing strips; (6) Wire return in window; (7) Savings on plastering and stucco; (8) Three blocks saved on an average window; (9) Labor of plumbing block in each opening; (10) Sash erection; (11) Caulking costs; (12) Treating wood bucks; and (13) Great savings in time on construction.

Sales volume is steadily on the increase, and many architects are now specifying Livesay windows. In the period from July, 1937, to July, 1938, 678 contracts were completed. These contracts include all sizes of houses and some apartments with up to 100 windows. A large volume of sales is in older homes to replace wood windows and much of the promotion is directed toward this type of modernization.

Livesay Window Co., Inc., has the exclusive manufacturing and licensing rights for the Livesay windows. John Lewis is president; Hollis Rinehart, secretary and treasurer, and Richard Killen, vice-president. The foreman of the plant is George Green.

Assembling a mold preparatory to casting a window of concrete. Note strips inserted for guides for Venetian blinds

George Green, foreman, left, supervises placing of concrete into mold on the vibrating table



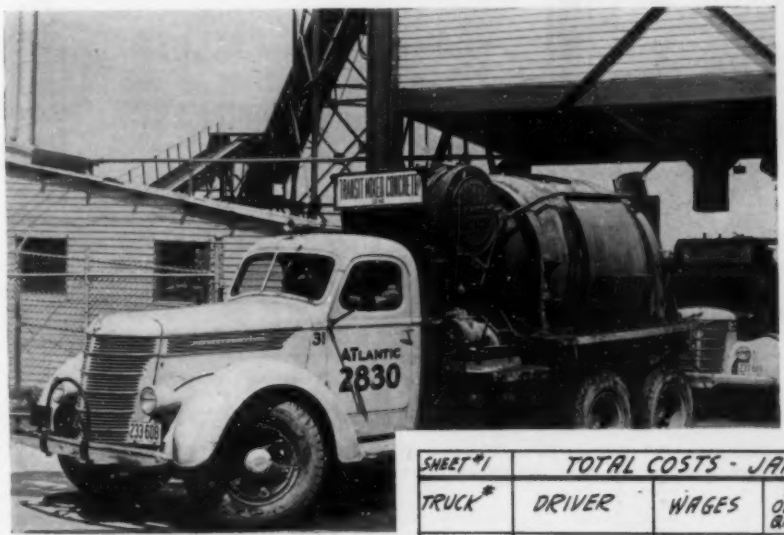
Several freshly poured concrete windows after they have come from vibrating table. Molds are on casters

Know Your Trucking Costs

Methods of determining ready-mixed concrete delivery costs which are such a major factor in arriving at a profitable price structure.

By FRED E. KUNKEL

KEEPING TRACK of the cost of fleet operation serves two useful purposes for the Transit Mixed Concrete Co., Washington, D. C. First, operating costs enter into the cost and selling price of the commodity, and second, it is possible to determine whether the trucks are costing too much to operate and where and why to economize to best advantage.



Mixer Trucks leaving the plant of Transit Mixed Concrete Co., Washington, D. C.

By having a complete breakdown of trucking costs per cubic yard for ready mixed concrete, plus the cost of the ingredients (cement, sand and gravel), plus overhead, it can be determined exactly what the product delivered on the job is costing.

Thus, if the total cost of trucking is $1.30 per cu. yd. and the cost of aggregates and cement is $4.00 or a total of $5.30, a bid for a big job cannot be turned in at $5.25 or even $5.50 because overhead figures must still be accounted for (which includes salaries, plant repair and upkeep, truck depreciation, etc.).

After working on a cost system for over a year, the Transit Mixed Concrete Co., finally arrived at a breakdown which would give them actual figures. It was found that a month-to-month basis was not nearly so satisfactory as using a three-months' period for determining costs.

Costs are first broken down into the following divisions: truck No.; driver's name; wages paid; fuel, gas-oil; repairs;—mixer, gas-oil; mixer repairs; and total.

These in turn are broken down into money by truck numbers and the total cost per truck and per mixer. Each day an accurate account is kept of the number of loads hauled per truck and the number of cubic yards per load, and this is totalled up for the three months' period, so that the company knows just how many yards were delivered to the job in that time and how many loads, and the total cost. The average load and the total cost of gas, oil, and repairs, plus wages paid are then easy to determine. The total yards for the period, mixer, size, and make and total repair costs for that unit are also known.

Determining Unit Costs

Unit costs are obtained by dividing the different amounts of money in wages into loads and yards, to give the amount of driver's cost per yard and per load. The same thing can

(Continued on page 62)

Four accounting forms which are used to find unit costs of trucks hauling ready-mixed concrete

SHEET #1 — TOTAL COSTS - JAN. 1 THRU MAR. 31

TRUCK #	DRIVER	WAGES	TRUCK OIL QRS.	TRUCK GAS GALS.	TRUCK REPAIRS	MIXER OIL QRS.	MIXER GAS GALS.	MIXER REPAIRS
	TOTALS							

SHEET #2 — GAS AND OIL COST

TRUCK #		TRUCK OIL	TRUCK GAS	MIXER OIL	MIXER GAS	TOTAL COST
	TOTALS					

SHEET #3 — UNIT COSTS - JAN. 1 THRU MAR 31

TRUCK #	TRUCK MAKE	AVG. LOAD	TOTAL LOADS	TOTAL C.YDS.	MIXER SIZE & MAKE	TOTAL (M&T.) REPAIR COST
	TOTALS					

SHEET #4

TRUCK #	MIXER G. & O. C.YD.	TRUCK G. & O. LOAD	TOTAL G. & O. C.YD.	MIXER REPAIRS PER. C.YD.	TRUCK REP. PER LOAD	TRUCK REP. PER C.YD.	DRIVER COST PER. LOAD	DRIVER COST PER. C.YD.	TOTAL OPERATING COST PER C.YD.
FLEET AVERAGES									

BUYERS' FREE SERVICE

RESEARCH SERVICE DEPARTMENT, *Rock Products*, 205 W. Wacker Drive, Chicago, Ill.
We are in the market for and would like to receive prices and literature on the items checked below:

....Admixtures
....Aerial Tramways
....Aggregates (Special)
....Agitators
....Air Compressors
....Air Separators
....Architectural Trimstone Molds
....Ash Receptacle Molds
....Ash & Refuse Handling Equipment
....Asphalt Mixing Plants
....Backdiggers
....Backfillers
....Bags
....Bagging Machines
....Balls (Grinding)
....Barges
....Batchers (Weighing)
....Bearings
....Belting (Conveyor & Elevator)
....Bins (Storage)
....Blasting Supplies
....Block Machines, Building
....Boats
....Brick Machines & Molds
....Buckets
....Building Tile Machines
....Bulk Cement Batching Plants
....Bulk Cement Storage Plants
....Bulldozers
....Bullscrapers
....Burial Vault Forms
....Calcining Equipment
....Calcium Chloride
....Cars (Industrial)
....Catch Basin Block Machines
....Cement Plants
....Cement Colors
....Cement Process
....Central Mixing Plants (Concrete)
....Chimney Block Machines & Molds
....Clarifiers
....Classifiers
....Coal Pulverizing Equipment
....Concentrators
....Concrete Mixers
....Concrete Paints & Coatings
....Concrete Waterproofing & Dampproofing
....Conveyors
....Conveyor Idlers and Rolls
....Coolers
....Corn Crib Block and Tile Machines
....Correcting Basins
....Cranes (Crawler & Locomotive)
....Crushers
....Crushing & Screening Plants (Portable)
....Culvert Pipe Machines & Molds (Concrete)
....Curing Equipment
....Curb Forms (Concrete)
....Dedusters
....Dehydrators
....Derricks
....Dewatering Equipment
....Dippers & Teeth
....Disintegrators
....Dragline Cableway Excavators
....Drain Tile Machines
....Dredges
....Dredge Pumps
....Drills (Rock)
....Drill Bits
....Drill Sharpening Machines
....Drill Steel
....Dryers
....Dust Collecting Systems
....Dust Precipitators
....Dust Recovery Plants
....Dynamite
....Electric Motors
....Electrostatic Separators
....Elevators
....Engineering Service (Consulting & Designing)
....Engines (Diesel, Gasoline, Steam)
....Feeders
....Fence Post Molds & Machines (Concrete)
....Floor Tile Machines (Concrete)
....Garbage Receptacle Molds (Concrete)
....Garden Furniture Molds (Concrete)
....Generators & Motor Generator Sets
....Greenhouse Bench Forms (Concrete)
....Guns (Hydraulic)
....Gutter Block Machines (Concrete)
....Hoists
....Hoppers
....Hose
....Hydrators (Lime)
....Joist & Slab Machines (Concrete)
....Kilns (Rotary, Shaft, Vertical)
....Laboratory Apparatus
....Laundry Tub Molds (Concrete)
....Light Post & Standard Forms
....Lime (Hydrated)
....Lime Handling Equipment
....Lime Plants
....Lime Putty Plants
....Loaders
....Locomotives
....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
....Mortar Mixers
....Pallets (Steel, Wood)
....Pans, Grinding (Wet & Dry)
....Perforated Metal
....Pipe Molds and Machines (Concrete)
....Pipe
....Plaster Mixers
....Pontoons
....Pulverizers
....Pumps (Pulverized Material)
....Railway Equipment
....Rectifiers
....Recuperators
....Refractories
....Rewashers (Screw)
....Rock Wool Cupolas
....Roofing Tile Machines
....Sand Dragas
....Sand & Gravel Plants
....Sand Lime Brick Machinery
....Sand Settling Tanks
....Scales
....Scrapers (Power Drag)
....Screens (Revolving, Vibrating, Etc.)
....Seal Rings
....Septic Tank Molds (Concrete)
....Sewer Pipe Machines (Concrete)
....Shale Planers
....Shovels (Power)
....Sidewalk Forms
....Sill Forms (Concrete)
....Silos (Storage)
....Silo Stave Machines
....Slakers (Rotary)
....Slurry Mixers
....Slurry Pumps
....Slurry Separators
....Slurry Thickeners
....Step Forms (Concrete)
....Tampers (Hand & Power)
....Tanks (Storage)
....Tractors
....Trucks (Agitator)
....Trucks (Dump)
....Trucks (Industrial)
....Trucks (Mixer Body)
....Unloaders
....Unloaders (Boat)
....Unloaders (Box Car)
....Wagons (Dump)
....Wall Forms & Machines (Concrete)
....Washers (Sand, Gravel & Stone)
....Welding & Cutting Equipment
....Well Curbing Machine & Molds (Concrete)
....Wire Cloth
....Wire (Copper, Iron & Steel)
....Wire Rope

Firm Name _____
Individual _____ *Title* _____
Address _____
City _____ *State* _____

Cinder Concrete's Best Year

Reports at National Cinder Concrete Association Convention indicate 1939 will be best year in history

OPTIMISM was the keynote of the 16th annual convention of the National Cinder Concrete Products Association held at the Claridge Hotel, Atlantic City, New Jersey July 31 and August 1 and 2. Both registration and attendance at the meetings exceeded all past records.

Those in attendance universally reported that the year 1939 will probably result in their selling more cinder units than in any previous year and their particular companies' history. The purchase of new equipment and daily production in boxcar figures and double and triple shifts were the principal subjects of discussion whenever two or more manufacturers gathered together.

Election of Officers

A new office was created this year —that of Chairman of the Board, to which Roy N. McCandless, Cinder Block, Inc., Detroit, Mich., was elected in recognition of his excellent administration as president during the past two years.

M. W. Ferguson, Cinder Block, Inc. of Roanoke, Va., was elected president. George W. Goelitzer, Cinder Concrete Products, Inc., Kansas City, Mo., and Cloyd B. Fellabaum, National Cement Products Co., Toledo, were elected vice-presidents.

Harry H. Longenecker, National Building Units Company, Philadelphia, Penn., was re-elected secretary-treasurer and Alvin H. Patterson was elected assistant secretary. In addition to the above officers, George H. Krier of the Nailable Cinder Block Corp., Brooklyn, New York and Herbert A. Davis, Washington Concrete Products Corp., Arlington, Va., were elected as members of the Board of Directors.

The Monday afternoon session was devoted to several excellent papers on housing and the housing market. E. W. Dienhart, Portland Cement Association, presented an interesting discussion on the volume housing market, pointing out that the large operative builders construct more than half the individual homes annually. Sales concentration on this type of builder was recommended as the most efficient method for increasing sales in this important market.

Reaching the Housing Market

H. S. Davidson of *Better Homes & Gardens* next presented an excellent summary of the house plan service offered to its readers—the Bildcost plan. During the discussion he pointed out that the concrete house plan published last year had been the most popular plan included in this service. The climax of his talk was a preview of the Bildcost house to be featured in the September issue of the magazine. This is the cinder concrete masonry home which has proved so popular in the Philadelphia area and which was designed by Robert C. Martin.

Robert M. Creaghead, New York manager of the Advertising Department, the *Architectural Forum* in his paper on market development emphasized the many desirable features of the cinder unit and stressed the importance, from an architect's standpoint, in being able to furnish any special shapes required. His talk illustrated numerous examples where this one feature had resulted in sales. Future sales channels on a national scale were outlined.

Charles P. Lower, president of the Eastern Concrete Products Co., Philadelphia, Penn., then introduced Joshua M. Holmes, one of the builders responsible for the popularity of the home featured in Mr. Davidson's talk. Mr. Holmes discussed in detail the development and sales of a complete subdivision of cinder unit homes of over 100 houses in Fox Chase Manor. In this subdivision a six-room home with the lot, is marketed at prices starting at $4450.

M. W. Ferguson, the new president of the N.C.C.P.A., to the left, and C. Grady Cates

Edmond A. Smith, sales manager

Fig. 1: Left to right, Geo. A. Kirk, FHA Director; Roy N. McCandless, Cinder Block, Inc., Detroit, Mich., and the new chairman of the board, N.C.C.P.A.; Harry H. Longenecker, National Building Units Co., Philadelphia, Penn., and efficient secretary of the association; and Charles H. Flanagan, chief building inspector, Philadelphia, Penn.

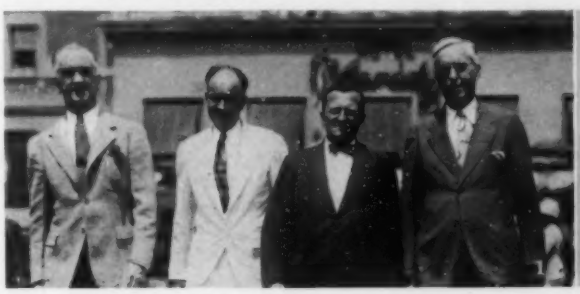
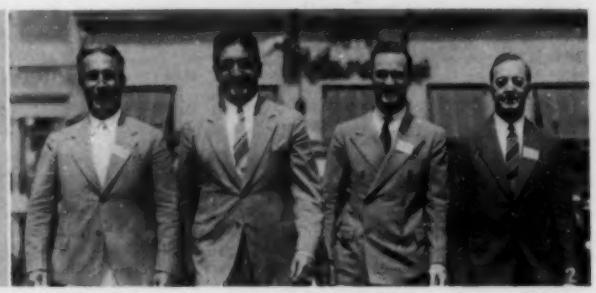


Fig. 2: Left to right, J. J. Wanicek, Nelson Concrete Stone Co.; Sam Paturzo, V. Paturzo & Son, Inc.; A. H. Patterson, Cinder Block Corp., assistant secretary of the association, all of whom represent Baltimore, Md., and E. S. Rowzee, Edwards Art Stone Co., Washington, D. C., on the end



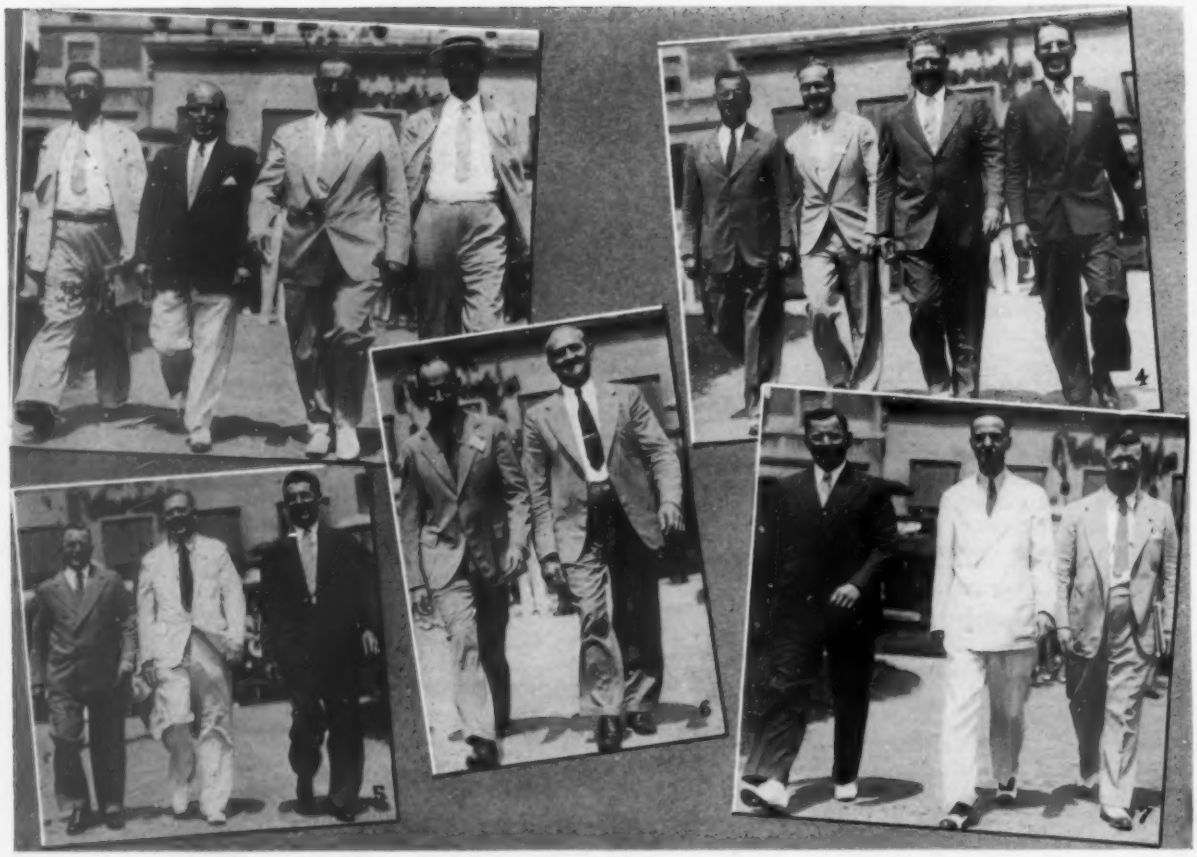


Fig. 3: Herbert A. Davis, Washington Concrete Products Corp.; William P. Carson, FHA; Ralph C. Cerido, James Condo & Sons; and Geo. W. Goelitzer, Cinder Concrete Products, Inc. Fig. 4: A. G. Watt, Lehigh Portland Cement Co.; Geo. W. Washa, University of Wisconsin; C. Grady Cates, Cinder Block Inc., Roanoke, Va.; and E. A. Soloman, Penn-Dixie Cement Corp.

Fig. 5: Jack Freedman, Massachusetts Cement Block Co.; Gene Olsen, Stearns Manufacturing Co.; and Charles W. Akers, Nashville Breeko Block and Tile Co. Fig. 6: Geo. Price, Massachusetts Cement Block Co.; and Francis J. Straub, the genial convention veteran. Fig. 7: L. Freedman, Massachusetts Cement Block Co.; Fred W. Reinhold, Anchor Concrete Products, Inc.; and Aiden C. McGuire, Comoe Builders Supply Corp.

and engineer, Cinder Block Co., Richmond, Va., presented a paper on the Ried Court development in Richmond —a low-cost housing project. He pointed out that the successful accomplishment of low-cost housing will be attained when the homes are—

(1) attractively and honestly built;
(2) within the reach financially of groups provided for;
(3) provide a fair return on the investment.

He then described in detail the construction of Ried Court in Fredricksburg, Va., which has cinder masonry walls and concrete joists with precast cinder slabs for first and second floor construction. The construction of the five houses, including grading, seeding and landscaping cost $20,000, or about 23½c per cubic foot. He also presented figures to show that the income on the investment was returning to the owners about 10 percent annually.

The Tuesday morning session was devoted to talks by Leo A. Kirk, director of the Federal Housing Administration of Eastern Pennsylvania and Delaware, and William D. Carson, financial relations manager, Federal Housing Administration, on the financing plan set up in the FHA Act and the progress to date. Subsequently, Mr. Charles A. Flanagan, chief, bureau of building inspection of the City of Philadelphia, talked on the place of concrete masonry units in building codes.

The Tuesday afternoon session was devoted to discussion of various research projects and testing of units. George W. Washa of the engineering faculty at the University of Wisconsin gave a very interesting discussion regarding plant control as a result of the special study which he is making at the plant of Cinder Block, Inc. of Roanoke.

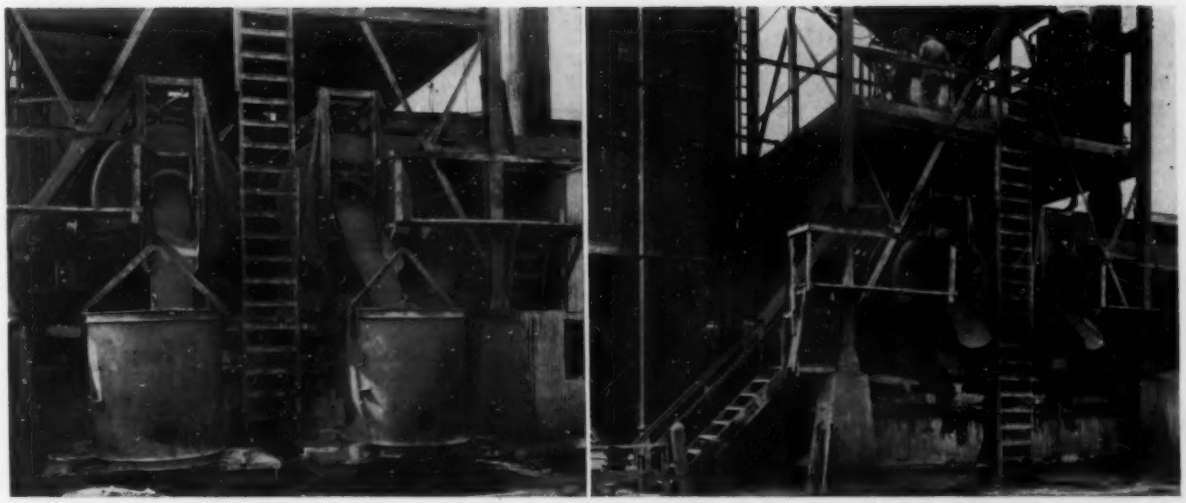
P. M. Woodworth, technical engineer, Portland Cement Association, presented a report on the testing of cinder units to determine the relationship between compressive strength and durability.

A. Willard Dudley, engineer, E. L. Conwell Co., presented a very interesting paper regarding the test work being conducted by the National Cinder Concrete Products Association as part of their certification plan. A committee report on standards was presented by H. E. Watt, and on research by Herbert A. Davis.

Wednesday morning, R. Loren Langsdale discussed the publication and growth of the NEWS—the official publication of the Association. This was followed by a discussion on the proposed series of fire tests on concrete masonry partitions at the National Bureau of Standards, which was led by Mr. Woodworth.

The session was closed with the report on the election of officers, and an open forum on plant design and practice.

As in the past, the group luncheons proved very popular and the entertainment was of the best. Monday evening an open house was held on the steel pier in the cinder masonry unit house which is featured there.



Left: A close-up of the two concrete mixers discharging to the cylindrical buckets which are transported by flat cars to the pipe forms. Right: batching and mixing plant

Makes Big Lock Joint Pipe

Sand and gravel and concrete mixing plants designed for fast work in the production of concrete pipe of special design

By NATHAN C. ROCKWOOD

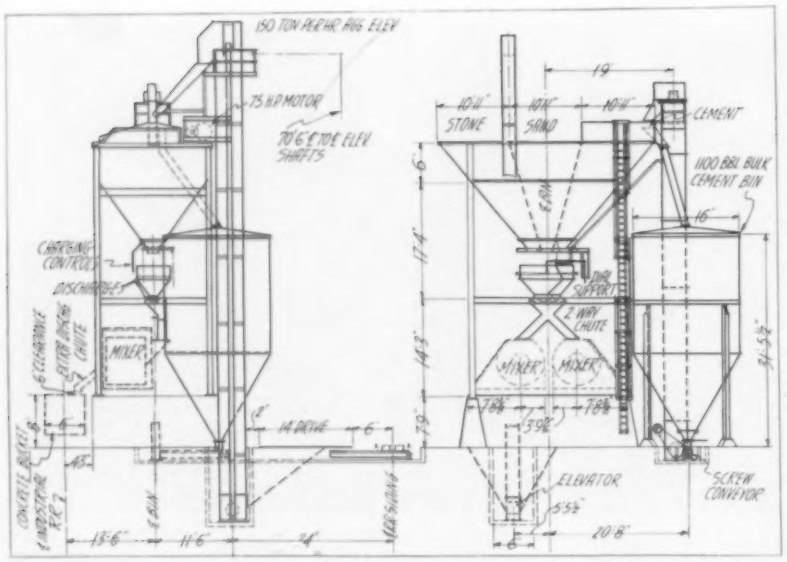
TO MANUFACTURE and deliver 15 miles of 84-in., 138-in., and 150-in. diameter Lock Joint reinforced-concrete pipe for the Metropolitan District Water Supply Commission, Boston, Mass., the Lock Joint Pipe Co., Ampere, N. J., has erected a plant near Natick, Mass., which contains several features of interest to the commercial ready-mixed concrete operator, or the large concrete products manufacturer. The pipe made here are of a special design to withstand hydraulic heads varying from 100 to 220 ft. These pipes are welded steel cylinders, the shells being surrounded by reinforced concrete, which results in a wall thickness of 8 in. for the 84-in. pipe and 12 in. for the 150-in. pipe. The pipe sections, 12 ft. long, weigh from 15 to 45 tons each.

Sand and Gravel Production

The company produces its own sand and gravel at Saxonville, several miles distant. About 125,000 cu. yd. of aggregate will be required, and it is said no commercial plant in the neighborhood was able to supply the demand at the rate required. As much as 1500 tons a day is necessary. This plant has a dry pit operation, the excavation being done with a 1-cu. ¾-yd. Northwest gasoline-powered shovel. Three motor trucks, two Fords and one International, of about 4 or 5 cu. yd. capacity each, make the short haul to the hopper at the plant. The crushing and screening plant, illustrated in detail herewith, was designed by the Kennedy-Van Saun Manufacturing and Engineering Co.

The plant is notable for its simplicity, since only two finished sizes of aggregate are made—sand and 1¼-in. gravel. The material is dumped into a hopper at grade, passing through a bar grizzley of inverted railroad rails, spaced about 9 in. apart. Material larger than this is too large for the crusher opening. The oversize from the grizzley is rolled down a chute to be hauled away. The chute from the bottom of the hopper delivers to a 5-ft x 9-ft. Kennedy single-deck vibrating screen, clothed with ½-in. Cross perforated plate with 2-in. square openings. The oversize is delivered to a No. 12 Kennedy Gearless crusher. The throughs pass to the sand box below the screen which delivers it to a 24-in. feeder belt, which feeds these fines to the main belt conveyor ahead of the crusher discharge. This conveyor carries the gravel to a 4- x 16-ft. two-deck Kennedy vibrating screen where

Sand and gravel plant which produces two finished sizes, 1¼-in. gravel and sand



Two elevation sketches of central mixing plant operated by Lock Joint Pipe Co., Framingham, Mass.

all the sizing and washing are done. The ¼-in. to 1¼-in. gravel is carried by belt conveyor to a ground stock pile, the oversize is chuted to a No. 25½ Kennedy gearless crusher below, the output of which is conveyed back to the sizing screen. The fines, which are sand, go to an 8-ft. Kennedy cone classifier to be graded, washed and dewatered. The cone discharges to a flat arched horizontal draining belt where the water content of the sand is said to be reduced to 25 percent. This belt feeds the conveyor to the sand stock pile.

The sand stock pile and the gravel stock pile are so situated that a small power shovel between them can load from either pile to hired motor trucks which operate between the sand and gravel plant and the pipe plant. The two products are of course hauled separately.

The plant is said to require but 152.5 hp., not including power for the well pump supplying the warm water. General Electric motors are used throughout.

Harry C. Gibson is plant superintendent.

Concrete Mixing

The concrete batching and mixing plant was designed and built by the Heltzel Steel Form and Iron Co. It is illustrated in detail herewith. The sand and gravel received by truck is dumped into a hopper, sand at one time and gravel at another. The hopper feeds into a bucket elevator which is equipped with a swivel spout serving two of three compartments of the batching bin. The sand and gravel compartments hold 75 cu. yd. each. A railway track parallels the truck driveway and the sand and gravel could be received by rails if a situation requiring it develops.

Cement is received in bulk in hopper bottom cars, and an under track screw conveys the cement to a bucket elevator, which discharges to the third (sealed) compartment of the batching bin (500 bbl. capacity). When this cement compartment is full, a signal notifies the operator and the elevator discharge is automatically deflected into a chute which discharges into an 1150-bbl. storage bin alongside the batching bin. This reserve bin discharges into the under-track screw conveyor serving the bucket elevator, when cars of cement are not available.

The sand and gravel elevator is designed to deliver 150 tons per hour and the cement elevator 45 tons. The sand and gravel elevator is driven by a 25-hp. motor and the cement elevator by a 15-hp. geared-head motor.

The average concrete mix is 1 part cement, 1.6 parts sand and 2.5 parts gravel. All ingredients are carefully tested and the compressive strengths of the concrete made average in excess of 4000 p.s.i. at 7 days and 6000 p.s.i. at 28 days.

The special Heltzel two-compartment batcher with a two-way discharge spout equipped with a bypass controlled by the operator charges two 2-cu. yd. Ransome 56-S mixers alternately. The sealed dustproof cement compartment is charged

Concrete mixing and batching plant, showing control platform, the two mixers, and the locomotive and flat car on which cylindrical buckets have been placed

through a Heltzel "Tubular" cement valve and a dust relief pipe carries the cement dust inside the batcher back to the top of the cement compartment. Air jets around the throat of the bin assure a constant flow of cement. Sand and gravel are discharged from the bin into the batcher through clamshell gates. Batches are weighed on a Kron dial scale and a meter with Spangler automatic valve assures the correct amount of water.

The mixers discharge to cylindrical buckets on cars of an industrial railway. One Whitcomb and one Plymouth gasoline locomotive are used for delivering the bucket trains to the yard where the pipe are made.

The buckets of concrete are removed from the flat cars by locomotive cranes and dumped into a special receiving hopper over the pipe forms. This hopper is rotated slowly as the concrete is run out, so as to deposit evenly around the form. The forms are vibrated electrically during the concrete placing. The forms are left in place for 24 hours, during which period moist steam is used for curing. After the forms are removed the pipe are covered with a canvas hood and the steam curing continued for two days. The pipe are then turned and stored under moist curing conditions for 12 days.

Wachusett Aqueduct

For delivering the pipe to the job five 150-hp. Diesel-powered Sterling truck tractors are used with low bed Jahn trailers capable of handling 50-ton loads. The average haul is about 7 miles. The five tractor-trailer units make 5 to 6 trips per day.

Above: Flat bed trailers and trucks used to haul concrete pipe

Right: Cylindrical bucket dumping concrete mix into hopper which rotates slowly as the concrete runs out to distribute it evenly

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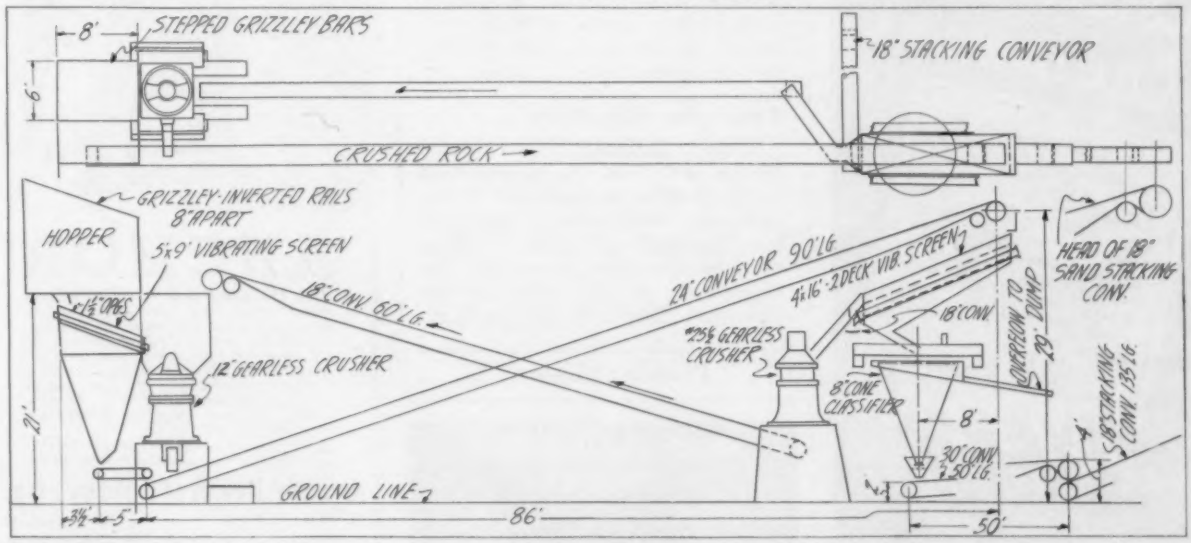
No small part of the interest of concrete products manufacturers in this project should be directed to the fact that it demonstrates the constantly expanding field for concrete products. A few years back and an aqueduct of this size would have been constructed of steel pipe entirely, or of monolithic reinforced-concrete. It is only fairly recently that engineers have accepted concrete pipe for such high pressures.

While it is true that from an engineering standpoint the pipe are essentially steel shells protected inside and out by reinforced-concrete covering, the fact remains that there are approximately an average of 21 cu. yd. of concrete per pipe. The steel shell however is what is designed to take the stresses from the hydraulic head, and every section of pipe is tested to 23,000 p.s.i., after being welded and before the concrete is placed.

It is also a matter of general interest that the cement used to make these pipe is manufactured under the Thaddeus Merriman specifications, which were first called to the attention of the industry in ROCK PRODUCTS, January, 1938. The cement is tested for the Water Supply Commission by Thompson & Litchner, Boston, Mass., as will be described in a later issue.

W. R. Brend is branch manager of the Lock Joint Pipe Co. in charge of this project.

Plan and elevation details of sand and gravel crushing and screening unit which furnishes aggregates for concrete pipe plant



Trucking Costs

(Continued from page 55)

be done for repair costs and for gas and oil, by dividing into loads and yards, to get the cost per cubic yard.

These figures can be further divided into unit costs per truck, gas and oil per load and also per yard; mixer repairs per yard and truck repairs per load and per yard, driver cost per yard and per load, or the total operating cost per yard. Adding all these gives the per yard total.

With this breakdown into how much oil and gas was used by the mixer and in the truck, the gas and oil per yard and per load, repairs per yard and per load, the total operating cost per yard is arrived at.

Thus, adding the operating cost to the cost of materials put into the mixer (sand, cement and gravel), and adding overhead, the exact cost of laying down a cubic yard of ready mixed concrete on the job can be determined.

The company has ten International mixer trucks with Jaeger mixers.

Taking the total cost and dividing it by ten gives the fleet average. With these figures, it is possible to have a further break down as to which truck is above average and which is below average, which truck is costing too much and why, which driver is costing too much in repairs, and which truck is running into too much repair; then cut your expenses.

To Build New Plant

J. B. WILLIAMS Co., Denver, Colo., concrete products manufacturer, plans to erect a plant with a capacity of 10 fabricated houses per week, using a new type of construction. Officers are J. B. Williams, trustee; C. H. Phillips, special agent; Alice T. Jordan, special agent; and Jos. Butterworth, treasurer.

Concrete Rip-Rap

LOUIS I. PENTZIEN of the Omaha Dredge and Dock Co., developer of an interlocking concrete unit for use as rip-rap, recently had a conference with City Engineer Keyes C. Gaynor of Sioux City, Iowa, to consider the employment of this design for the protection of 4000 ft. of river bank. The estimated cost of the 4000 ft. of protection, 85 ft. deep, would be around $50,000.

Starting In Business

MARIS HACKMAN, Lancaster, Penn., recently opened up a concrete products plant just south of Lancaster, making sand and gravel and cinder concrete blocks. He was with the Lancaster Concrete Tile Co. for 18 years.

•

C. L. MARTIN, who was formerly in business in Texas and New Mexico, has opened up a concrete brick factory in Willcox, Ariz.

•

LEE C. SWARTZ, formerly located at Grand Coulee, has purchased nine acres in Ephrata, Wash., and is now erecting a concrete products plant. Concrete tile and brick will be among the products manufactured.

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NELS LUNDORFF, Sandstone, Minn., has installed a concrete block machine which he will operate in connection with his lumber and building supply business.

•

BRODERICK BROS., Riverside, Mich., operate a sand and gravel pit in connection with their concrete block and concrete burial vault business.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of August 12:

Central

58895 (cancels WDA 58403). Establish on **sand, ground or pulverized,** in all kinds of equipment, C. L., but orders will not be accepted for closed and open top cars of less marked capacity than 60,000 lb. and 80,000 lb., respectively (see Note); Ottawa, Ill., group (as described in WTL Trf. 41-Z), to Windsor, Ont., 367c per net ton. Note—When a shipper orders a car of above mentioned marked capacities or greater, and carrier is unable to furnish car ordered and furnishes a car of greater capacity than that ordered, the min. wt. for car furnished will be that which would have obtained had car ordered been furnished and used.

58907. Establish on **stone, crushed,** also **limestone, agricultural** (not ground or pulverized), in bulk, in open top cars only, C. L., subject to the following: "The max. wt. limit of cars and contents over bridges located on the Ohio River Branch, Wheeling Division, of the B. & O. R. R., is 130,000 lb., and when, as a result of the observance of the weight limit clearance, cars are loaded to less than C. L. min. prescribed, the min. wt. will be 90% of the difference between the tare weight of the car and max. wt. limit clearance," from Shimer, O., to pts. in W. Va., rates as shown below, via N. & W. Ry., Kenova, W. Va., B. & O. R. R.: Millender, 121; Guyandotte, 132; Millersport, 132; Clover, 143; Apple Grove, 143; Gallipolis, 143; Nursery, 154; Hallwood, 154; West Columbia, 154; Clifton, 154; New Haven, 154; Longdale, 154; School House, 165; Meyercord, 187; Salama, 198; Friendly, 198; Mendota, 209; Minnie, 220; Evans, 185; Silverton, 185; Meadowdale, 196; Seaman, 196; Barrs, 196.

58979. Establish on **slag, crushed** or **crushed commercial,** in open top cars, Jackson, O., to Cyrus, W. Va., 132c net ton.

58964. Establish on **lime, common, hydrated, quick** or **slaked, in bags, barrels, casks,** iron drums, or in bulk as provided for straight C.L. in Official Classn., Mosher and Ste. Genevieve, Mo., to points in Mich. and Ohio. (Rates in cents per 100 lbs.) "A" refers to min. wt. of 36,000 lb. and "B" to min. wt. of 50,000 lb. To Athens, O., (A) 22, (B) 18; Cadiz, O. (A) 24, (B) 19; Carrollton, O. (A) 24, (B) 19; Hillsboro, O. (A) 20, (B) 17; Jefferson, O. (A) 24, (B) 19; Logan, O. (A) 22, (B) 18; Malta (Connellsville), O. (A) 23, (B) 18; Mt. Gilead, O. (A) 21, (B) 17; Nelsonville, O. (A) 22, (B) 18; Norwalk, O. (A) 22, (B) 18; Painesville, O. (A) 24, (B) 19; Paulding, O. (A) 20, (B) 17; Pomeroy, O. (A) 23, (B) 18; St. Clairsville, O. (A) 24, (B) 19; Urbana, O. (A) 20, (B) 17; Big Rapids, Mich. (A) 23, (B) 18; Gladwin, Mich. (A) 24, (B) 19; Harrison, Mich. (A) 24, (B) 19; Hastings, Mich. (A) 22, (B) 18; Ion, Mich. (A) 22, (B) 18; Lake City, Mich. (A) 24, (B) 19; Mt. Clemens, Mich. (A) 23, (B) 18; Sandusky, Mich. (A) 24, (B) 19.

59075. Establish on **dolomite, roasted** (refractory dolomite, in granular form, treated or untreated, clinkered or burned to a dead state), Narlo and Maple Grove, Ohio, to Alabama City, Anniston, Birmingham and Woodward, Ala., 492c net ton.

Sup. 1 to W. D. A. 59075. Amendment notice. White Docket Advice 59075., on **dolomite,** C. L., Narlo and Maple Grove, Ohio, to Alabama City, Anniston, Birmingham and Woodward, Ala., is hereby amended by providing for addition of Durbin, Ohio, to destinations at proposed rate of 454c per net ton.

59081. Establish on **dolomite, roasted** (same as 59075, above), to Knoxville, Tenn., 463c net ton.

Sup. 1 to W. D. A. 59081—Amendment notice. White Docket Advice 59081, Docket Bulletin 2995, dated July 12, 1939, on **dolomite,** C. L., Narlo and Maple Grove, Ohio, to Knoxville, Tenn., is hereby amended by providing for the addition of proposed rate of 426c per ton from Durbin, Ohio, to Knoxville, Tenn.

59090. Establish on **limestone, agricultural,** unburnt, and **screenings, agricultural limestone,** in bulk, in open-top cars, Spore, O., to Port Homer, Empire, Toronto, Steubenville, Mingo Junction, O., 149c; Brilliant, Rush Run, Rayland, Tiltonville, Yorkville, Fernwood, O., 160c; Broadacre, Fairplay and Unionport, O., 149c net ton.

59091. Establish on **sand** (except industrial), and **gravel,** C. L., Peru, Ind., to Valparaiso, Ind., 61c net ton.

59092 (Cancels W. D. A. 57804). Establish on **dolomite, roasted refractory dolomite,** in granular form, treated or untreated (clinkered or burned to a dead state), min. wt. 60,000 lb., Bottsville, Durban, Maple Grove, Martin, Narlo and Woodville, Ohio, to Sault Ste. Marie, Mich., 29c.

59102. Establish on **stone,** crushed, **slag** or **gravel,** coated with oil, tar, or asphaltum, in open top equipment, Grand Rapids, Mich., to Reed City, Mich., 143c, and Traverse City, Mich., 194c net ton.

59103. Establish on **sand** (industrial) and **gravel,** in open top cars, without tarpaulin or other protective covering, Parkersburg, W. Va., to Pomeroy, Ohio, 121c net ton.

59115. Establish on **crushed stone,** C. L., North Vernon, Ind., to Indianapolis, Ind., 94c per net ton, via P. R. R. direct.

59120 (1). Establish on **stone,** crushed, **slag** or **gravel,** coated with oil, tar or asphaltum (see note 7) in open top cars, in straight or mixed C. L. from Donora (Baird), Penn., to pts. on the P. & W. V. Ry. in Penn., shown below, viz.:

Penowa, 113c; Avolia, Rea, Woodrow, Hickory, Acheson, George, Venise, 102c; Bridgeville, South Carnegie, Rook, Pittsburgh, West End, Banksville Jct., West Liberty, Oak, Fair Haven, Castle Shannon, Foleys Siding, Bonicoll, Longview, Coverdale, Option, Mifflin Jct., Horning, 91c; Bruceton, Stilleys Siding, Large, 80c; Clairton, 91c; Maple (Washington Co.), Rider, Monessen, 80c; Connellsville, 91c per net ton, via P. & W. V. Ry.

59122. Establish on **silica rock, crushed** (not ground or pulverized), in open top cars, C. L., Burnette, Ohio, to Lorain, Ohio, 110c; Youngstown, Ohio, 55c; Bessemer, Braddock, McKeesport, Penn., 132c; Pittsburgh, Penn., 121c; Benwood and Wheeling, W. Va., 143c per net ton.

59126. Establish on **sand,** all kinds, or **gravel,** C. L., Somerdale, Ohio, to Elmore, Ohio, 138c, W. & L. E. Ry., Norwalk, Ohio, N. Y. C. R. R.; Louisville, Ohio, 88c, and L. E. Ry., Valley Jct., O., P. R. R., W. & W. & L. E. Ry., Orrville, Ohio, P. R. R., Toronto, Ohio, 99c per net ton.

59127. Establish on **sand,** viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, C. L., Dundee, Ohio, to Oshawa, Ont., 446c per net ton.

59132. Establish on **sand** (except industrial), and **gravel,** in open top cars, C. L., Elkhart, Ind., to Valparaiso, Ind., 66c per net ton, via N. Y. C. R. R., South Bend, Ind., and G. T. Ry.

59152. Establish on **sand** (except industrial) in open equipment, C. L. (See Note 6) and in closed equipment, C. L., from the so-called Vassar Groups, viz.: Vassar, Wampson, McHale, Juniata and Watrousville, Mich., to Auburn, N. Y., 297c per net ton.

59153. Establish on **limestone,** crude, fluxing, foundry and furnace when loaded in bulk in open top equipment, C. L., Inwood, W. Va., to Neville Island, Penn., 128c per net ton.

59154 (2). Establish on **crushed stone** and **screenings,** in open top cars, straight or mixed C. L., East Fultonham, Ohio, to B. & O. R. R. stations in Ohio, viz.: Fair Oaks, Frazier, Sealover, Philo, Merriam, Stone, Eagleport, 77c; Oil Spring, 83c; Malta, Hooksburg, 88c; Stockport, Roxbury, Brokaw, 94c; Beckett, Belief, Hayward, Waterford, Congress Run Pit, 99c; Lowell, Rainbow, 105c; Willow Farm, West Marietta and Marietta, 110c per net ton, via P. R. R.—Zanesville, Ohio—B. & O. R. R.

59174. Establish on **stone,** crushed, slag or **gravel,** coated with oil, tar or asphaltum (See Note 7), in open top equipment, C. L., Terre Haute, Ind., to Ademore, Ill., Reelsville, Ind., Paris, Ill., Rockville, Ind., 106c; Vevay Park, Ill., Fillmore, Ind., Oakland, Ill., Waveland, Ind., 118c; Montrose, Ill., Plainfield, Ind., Chesterville, Ill., Garfield, Ind., 131c; Funkhouser, Ill., Indianapolis, Ind., Lovington, Ill., Manson, Ind., 143c; Vandalia, Ill., Greenfield, Ind., Decatur, Ill., Flora, Amity, Herr Campbells and Lebanon, Ind., 156c per net ton.

59175. Establish on **crushed stone** and **crushed stone screenings,** in bulk in open top cars, C. L., Ridgeville, Ind., to Dubuque, Ia., 230c per net ton.

59186 Cancels W. D. A. 59126. Establish on **sand,** all kinds, or **gravel,** in open top cars, C. L., Somerdale, Ohio, to Elmore, Ohio, 138c; W. & L. E. Ry., Norwalk, Ohio, N. Y. C. R. R.; Louisville, Ohio, 77c; W. & L. E. Ry., Orrville, Ohio, P. R. R.; Toronto, Ohio, 99c per net ton, W. & L. E., Valley Jct., Ohio, P. R. R.

59188. Establish on **traffic-bound gravel,** road surfacing, not suitable for

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Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

concrete construction, passing through a 1-in. screen, C. L., (See Note 1), except when loaded full, actual wt. will apply, Attica, Ind., to Sibley, Ill., 50c per net ton.

59189. Establish on (a) **sand,** naturally bonded moulding, in all kinds of equipment, C. L.; **sand,** (except naturally bonded moulding; ground or pulverized sand), in closed equipment C. L.; (b) **sand,** ground or pulverized, in all kinds of equipment, C. L.; (c) **sand,** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L. (See Note 6); Grand Haven, Muskegon and Rosy Mound, Mich., to Auburn, N. Y., (a) 341c; (b) 375c and (c) 341c per net ton.

59191. Establish on **sand** (except industrial) and **gravel,** in open top cars, C. L., Elkhart, Ind., to Springville, Ind., 66c; net ton, via N. Y. C. R. R., LaPorte, Ind., and P. M. Ry.

59250. Establish on **sand** (except industrial), in open equipment, C. L. (See Note 6) and in closed equipment, C. L., from the so-called Vassar group, viz.: Vassar, Wampson, McHale, Juniata and Watrousville, Mich., to Columbus, Ind., 297c per net ton.

59253. Establish on **crushed slag** or **crushed commercial slag** (other than granulated) in open top cars, C. L., Hamilton, O., to Versailles, O., 110c per net ton.

59278. Amend C. F. A. L. Trf. 147, Item 620, by cancelling therefrom present rates shown below, which apply on **carbonate of calcium** or **lime,** N. O. I. B. N. in Official Classn., C. L., min. wt. 40,000 lb.

	Pres.	*Prop.
From Painesville, Ohio, to Kansas City, Mo.	41	42
From Akron, Ohio, to Omaha, Neb.	43	44
From Barberton, Ohio, to Omaha	43	44
From Painesville, Ohio, to Omaha	43	44

*Class 22½, min. wt. 40,000 lb.

Trunk

Sup. 1 to 37934. **Stone,** crushed, slag and/or gravel, coated with oil, tar or asphaltum (see note 7) in open top cars, in straight or mixed C. L. (See Note 3), from Donora, Penn., to P. & W. V. Ry. stations in Pennsylvania, rates ranging from 80c to $1.13 per net ton.

Sup. 1 to 37944. **Aplite rock,** C. L., from Piney River, Va., to Abingdon, Alton, E. St. Louis, Granite City, Macomb, Monmouth, Whitehall, Ill., and St. Louis, Mo., $5.60 per net ton. (See Note 5.)

37959. **Slag,** C. L., (See Note 5), from Low Moor, Va., to Wabash, Ind., 16c per 100 lb. in lieu of present 6th class rate 36c. Reason: Rate comparable with others involving like hauls.

37966. **Sand** (other than industrial) and **gravel,** in open top cars, without tarpaulin or other protective covering, C. L., (See Note 3), from Parkersburg, W. Va., to Pomeroy, Ohio, $1.21 per net ton in lieu of present 6th class rate 16c per 100 lb. Reason: Rate comparable with others involving like distances.

37967. **Limestone,** crude, crushed, foundry, furnace or fluxing, C. L., min. wt., (See Note 3), from Bittinger, Thomasville and York, Penn., to Baltimore, Md., $1.05 per gross ton, in lieu of present rate 15c per 100 lb. (See Note 5.)

37970. **Crushed stone,** C. L., (See Note 3), from Riverton, Va., to Waterloo, Va., rate of 99c per net ton, in lieu of present rate of 149c per net ton. Reason—Rate comparable with others involving like hauls.

37968. **Limestone,** crude, fluxing and furnace in open top equipment, C. L., (See Note 3), from Capon Road and Strasburg Jct., Va., to Bellaire, Ohio, Benwood, Follansbee, W. Va., $1.39; Bentley, Ohio, $1.62; Alliance, Ohio, $1.79, and Huntington, W. Va., $2.20 per gross ton in lieu of present rates. Reason: Proposed rates on a relative basis with others to destinations in the same general territory.

37975. **Dry building mortar,** C. L., from Great Notch, N. J.; "1" refers to min. wt. of 30,000 lb. and "2" to min. wt. of 50,000 lb.: (1) to Chicago, Ill., 660; Chicago Heights, Ill., 660; Cincinnati, Ohio, 627; Cleveland, Ohio, 528; Detroit, Mich., 594; (2) to Chicago, Ill., 550; Chicago Heights, Ill., 550; Cincinnati, Ohio, 517; Cleveland, Ohio, 418; Detroit, Mich., 484.

In lieu of current sixth class rates.

37990. Cancels rate proposal No. 37733—**Feldspar,** crude, C. L., min. wt. 100,000 lb., to Genesee Dock (rail delivery), N. Y.: From (Ont.) Gooderham, 13; Tory Hill, 13; Wallace, 13; McConnell, 13; Hybla, 13; Birds Creek, 13; Bancroft, 13; Bronson, 13; Lakefield, 13; Hiam, 17½; from (Ont.) Indian, 17½; Seguin Falls, 14; Edgington, 14; Waubamic, 14; S. Magnetawan, 14; Madawaska, 17½; Barrys Bay, 17½ Trout Creek, 14; Opeongo, 17½.

(Rates in cents per 100 lbs.) (See Note 5.)

37998. **Limestone,** crude, fluxing, foundry or furnace, when loaded in open top equipment, C. L., (See Note 3), from Capon Road to Strasburg Jct., Va., to Bethlehem, Penn., $2.04; Chester and Philadelphia, Penn., $1.85; Lebanon, Penn., and Wilmington, Del., $1.62, and Sayre, Penn., $2.40 per gross ton, in lieu of current sixth class rates. Rate to Bethlehem, Penn., will not apply in connection with L. & N. E. R. R. (See Note 5.)

38011. **Sand,** other than industrial, in open top cars, without tarpaulin or other protective covering and sand, other than industrial, in closed cars or in open top cars, with tarpaulin or other protective covering, C. L., (See Note 3), from Blossvale, McConnellsville and Humaston, N. Y., to Williamsport, Penn., $2.04 per net ton, in open top equipment, and $2.20 per net ton in closed equipment, in lieu of current sixth class rates. (See Note 5.)

Southwestern

17489. **Dolomite, roasted,** Dolly Siding, Mo., to Sault Ste. Marie, Ont., and Sault Ste. Marie, Mich. Establish rate of 462c per net ton on dolomite, roasted, C. L. min. wt. 80,000 lb., from Dolly Siding, Mo., to Sault Ste. Marie, Mich., and Sault Ste. Marie, Ont.

17555 (1)—**Stone,** cancel Item 805, S. W. L. Tariff 30-N, and in lieu thereof establish following rates and min. wts. from Llano, Marble Falls, Granite Mountain and Cedar Park, Tex., to New York, Baltimore, Norfolk, New Bedford and Boston (Morgan Line Piers) via Gulf routes: (Rates in cents per 100 lbs.) Rough stone, min. wt. 80,000 lbs., 40c; Dressed stone, min. wt., 50,000 lbs., 50c; Polished stone, min. wt. 36,000 lbs., 70c. Subject to mixed carload rule as per Item 26, page 355, Consolidated Classification 13.

Southern

19640. **Crushed stone,** C. L. Establish 110c net ton, Gay, Fla., to Jacksonville, Fla. Water competitive.

19517. **Crushed stone and stone screenings,** C. L. Establish 109c net ton from Camak and Lithonia, Ga., to Elberton and Middleton, Ga. Expires 12-31-39.

19761. **Sand, gravel and crushed stone,** C. L. Establish to Emco, Ala., from Spruce Pine, Ala., 60c, and from Gravel Siding, Miss., 66c net ton.

19786. **Gypsum, crude or crushed,** C. L., min. 80,000 lb. Establish 9c cwt., Jacksonville, Fla., to Brunswick, Ga.

19820. **Feldspar,** C. L., min. 60,000 lb. Establish 275c net ton—Clinchfield and Black Mountain feldspar grinding plants to Laurens, S. C. Truck competitive.

19889. **Crushed stone,** C. L. Establish 120c net ton, Gay, Fla., to Indiantown, Fla. Water competition. Expires Dec. 31, 1939.

Illinois

I. R. C. 8786-A—**Sand and gravel,** C. L., usual min. wt., from Zones 1, 2 and 3 to connecting line deliveries in the Chicago switching district (interstate traffic).

(Rates in cents per ton of 2,000 lbs.)

	Interstate single line	
From Zone 1	Pres.	Prop.
Aurora, Ill.	72	65
Conkey Switch, Ill.	72	65
Oswego, Ill. (Yagan Gravel Pit)	72	65
Yorkville, Ill.	72	65
From Zone 2		
Millington, Ill.	77	70
Sheridan, Ill.	77	70
Ottawa, Ill.	95	88
Wedron, Ill.	95	88
Oregon, Ill.	88	80
From Zone 3		
Spring Valley, Ill.	95	95
(For information only)		
Rockford, Ill.	97	88

	Interstate joint line	
From Zone 1	Pres.	Prop.
Aurora, Ill.	94	85
Conkey Switch, Ill.	94	85
Oswego, Ill. (Yagan Gravel Pit)	94	85
Yorkville, Ill.	94	85
From Zone 2		
Millington, Ill.	95	90
Sheridan, Ill.	95	90
Ottawa, Ill.	95	90
Wedron, Ill.	95	90
Oregon, Ill.	95	90
From Zone 3		
Spring Valley, Ill.	95	95
(For information only)		
Rockford, Ill.	105	95

I. R. C. 8834. **Crude shale,** C. L. (See Note 1), but not less than 100,000 lb., from Dayton, Ill., to Joliet, Ill. Present—$1.32 net ton. Proposed—75c net ton.

I. R. C. 8860. **Granulated slag** (light weight concrete aggregate), C. L. (See Note 3), but in no case less than 40,000 lb., from Chicago (South Chicago), Ill., to Spring Grove, Ia. Present, $4.60 net ton; proposed, $1.90 net ton.

New England

47488 (1-R). **Feldspar,** in packages or in bulk, min. wt. 60,000 lb., Smith's Falls and Brockville, Ont., to Bates, Me., Keene, N. H., and South Paris, Me. Present—90% of sixth class. Item 1310. Agent G. C. Ransom's 15H, I. C. C. 115; also Ransom's 41, I. C. C. 107 (I. N. Doe's 41, I. C. C. 328). Proposed—17½c.

47683 (2-R). **Neutralized spent lime,** min. wt. 60,000 lb., Cumberland Mills, Me., to North Toronto, Ont. Present, 46c 100 lb. (6th class per Agent Doe's I. C. C. 328); proposed, 34c 100 lb.

48149 (2-R). Establish rates on **feldspar and nepheline syenite,** C. L., (See Note 1), from Keene, N. H., to Abingdon, Alton, E. St. Louis, Granite City, Macomb, Monmouth, Whitehall, Ill., and St. Louis, Mo. Present—Class 21; proposed—$6.70 per net ton standard and $6.50 per net ton differential. From Bates, Bath, Bethel, Cathance, Dunns, Littlefield, Lockes Mills, Norway, South Paris and Topsham, Me., to Abingdon, Alton, E. St. Louis, Granite City, Macomb, Monmouth, Whitehall, Ill., and St. Louis, Mo. Present—Class 21; proposed—$7.30 per net ton standard and $7.10 per net ton differential. (See Note 5.)

FREE ! New Literature

THE bulletins and catalogs described below are for your benefit. To save you the necessity of writing individual letters, those you want can be obtained by merely checking and mailing the post card on this page.

1 ALLOY STEEL.—Joseph T. Ryerson & Son, Inc., has issued a bulletin describing the qualities of Stress-proof No. 2—a non-warping shafting and machinery steel which is said to combine high strength, free machinability and unique wearability.

2 BEARINGS.—Gwilliam Co. has issued a new catalog No. 16 about its line of ball and roller bearings which also contains illustrations of various types and lists of standard sizes.

3 CAR AND BARGE HAULAGE SYSTEMS.—Robins Conveying Belt Co. Bulletin No. 106 is about the Robins Mead-Morrison car and barge haulage systems. In addition to describing and giving specifications for the various sizes offered, it contains diagrams of typical layouts for car haulage systems and a typical barge haul installation.

4 CIRCUIT BREAKERS.—General Electric Co. Bulletin GEA-2426B is about the Type FLO line of moderate-duty outdoor oil-blast circuit breakers. Bulletin GEA-2596A contains a description of G-E metal-enclosed switchgear with draw-out air circuit breakers and points out the ease with which the various models can be rolled in and out of operating position.

5 COMBUSTION TESTING INSTRUMENTS.—Hays Corp. Publication No. 39-323 contains information about the Hays portable draft gages, flue gas thermometers, combustion test sets, and orsatomat. It also illustrates graphically how the Hays analyzer employs the Orsat principle.

6 DIESEL-ELECTRIC LOCOMOTIVES.—General Electric Co. Bulletin GEA-3071A describes and illustrates the features, economies and uses of G-E. Diesel-electric industrial locomotives.

7 EARTH-MOVING EQUIPMENT.—R. G. LeTourneau, Inc., has released two booklets, A912 and A913, the first describes by word and picture how 3 to 30 cu. yd. Carryalls handle a job with controlled results in any kind of weather, and the second covers the large capacity Carryalls in a like manner.

8 HAULING UNITS.—Euclid Road Machinery Co. has issued a broadside which is profusely illustrated with many views of Euclid Trac-Truck and bottom dump and rear dump bodies at work.

9 LOADING, HAULING AND DUMPING MATERIALS.—Good Roads Machinery Corp. Bulletin 239 is about the Speed Dumper detachable buckets. The text is supplemented by a number of illustrations showing how the Speed Dumper works and its uses.

10 MAGNET WIRE.—Anaconda Wire and Cable Co. has reprinted its magnet wire catalog with considerable revision, giving more information on magnet wire, its electrical and physical properties and the use of magnet wire coils. A small size pocket handbook containing technical tables and information has also been issued.

11 METERS AND CONTROLS.—Bailey Meter Co. Bulletin No. 104 describes the use and operation of Bailey controls and recorders in kiln control.

12 MILLS.—Raymond Pulverizer Division, Combustion Engineering Co., Inc. Bulletin No. 42 presents in a clear manner with excellent illustrations some of the latest types of Raymond mills, including roller mills, imp mills, pulverizers, screen mills, etc.

13 MOTOR CONTROLS.—Cutler-Hammer, Inc., has issued an interesting booklet "Dust the Destroyer" which describes this line of motor controls and illustrates why their motor controls do not become burned, pitted, or sticky from exposure to dusts.

14 PACKING AND WEIGHING MACHINES.—Modern Valve-Bag Co. has issued a bulletin which describes in detail and graphically illustrates the features of the "Modern" Type 4 BB machine.

15 PORTABLE CONCRETE PLANT.—Erie Steel Construction Co. Bulletin SCP No. 1-39 details the features of the Sprayer portable concrete mixing plant.

16 REFRACTORIES. — General Refractories Co. recently published a new book on basic refractories which contains data on processes, application, use and construction. It has also published a book entitled "Boiler Refractories." This contains chapters on boiler refractory selection and construction, standards of the American Society of Testing Materials, and tables for refractory use.

17 POWER TRANSMISSION PRODUCTS.—Morse Chain Co. has issued Bulletin 75, which presents the features, design data, capacity curves, sprocket information, and other information on the line of Morse flexible couplings and universal drives.

18 RECORDING POTENTIOMETER. — Bristol Co. Bulletin 507 describes and illustrates Bristol's pyromaster, which is offered as a pyrometer, tachometer, resistance thermometer, and millivoltmeter.

19 SWITCHGEAR. — Allis-Chalmers Mfg. Co. has just issued bulletin B6012 about their complete line of vertical-lift, metal clad switchgear and bulletin B6011, which contains many new installation views, dimension sheets and wiring diagrams, as well as application and construction data on their indoor, cubicle type switchgear.

20 TESTING INSTRUMENTS.—American Instrument Co. has published a new 164-page catalog. In the cement section is included a description of instruments for testing portland cement, concrete, mortar, aggregates, lime, gypsum, etc.

21 TRACTORS.—Allis-Chalmers Mfg. Co. A new 24-page catalog describes and profusely illustrates the features and uses of Allis-Chalmers Model "B" tractor which, it states, is designed expressly to take advantage of the extra power in the high octane gasolines now available.

22 TRACTORS.—Caterpillar Tractor Co. has just published a 32-page booklet containing specifications, action photographs and a description of mechanical features of the Caterpillar Diesel D6 tractor.

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USE POST CARD BELOW

23 BALL BEARINGS, SEALED.—SKF Industries, Inc. The SKF red seal bearing is a new line of sealed ball bearings. The seal used can be applied to bearings having a standard single row S.A.E. dimension of bore, inner and outer race width.

24 CO_2 INDICATOR. — Bacharach Industrial Instrument Co. announces a new pocket-size CO_2 indicator, called Fyrite which contains no valves, no clamps and no leveling bottle to manipulate. The entire analysis, including the pumping of the gas, is said to take less than a minute.

25 COMPRESSORS, PORTABLE.—Quincy Compressor Co. Portable air compressor on a detachable mounting so the tractor can be used for other purposes consists of a Model "B" Allis-Chalmers tractor and a Model WW80 water cooled Quincy compressor. Compressor piston displacement is rated at 80 cu. ft. per minute maximum and free air delivery is approximately 58 cu. ft. per min. at 80 lbs. per sq. in. discharge.

26 CONVEYOR IDLERS.—B. F. Goodrich Co. has introduced a new type shock impact mounting to reduce severe impact at loading points. The mountings permit the entire belt, idler, and frame to recoil from impact, the recoil being absorbed by the movement of rubber in the mounting.

27 CRUSHERS.—Stephens-Adamson Mfg. Co. Ring type crusher features triangular shaped manganese steel sectors which, it is claimed, operate so as to crack lumps rather than crush them, thus minimizing pulverizing to reduce the volume of fines.

28 DIESEL ELECTRIC ENGINES.—Caterpillar Tractor Co. announces two new, completely self-contained diesel electric sets of 15 and 20 kw. capacity, designed as a low cost power unit or prime mover for mining and quarrying jobs.

29 DRAIN TILE MACHINE.—W. E. Dunn Mfg. Co. A low priced drain tile machine has been announced which is particularly designed for the smaller markets where a large investment in equipment is probably not justified. It produces all sizes up to 8-in. at an average production speed of 4 per minute.

30 DIESEL NOZZLE TESTER.—The Buda Co. Buda Hydraulic Diesel nozzle tester permits accurate testing of fuel injection nozzles manufactured by Bosch, Timken, Deco and many others. With it Diesel nozzles can be tested and cleaned "on the job."

31 ELECTRIC HOIST.—Conco Engineering Works. A completely enclosed, cable and drum type electric hoist, available in capacities of from 250 to 1000 lb. and featuring double drum construction, push button control, electric brake, and heavy duty construction throughout has been placed on the market as the Conco torpedo electric hoist.

32 ELECTRICAL POWER MEASUREMENT.—The Bristol Co. announces a new thermal converter, known as the Thermoverter, for measuring a-c electrical power with any potentiometer or D'Orsonval millivoltmeter.

33 ENGINES.—Waukesha Motor Co. engines are unique in their basic design. Intended for use with oil, gasoline, butane, or producer or natural gas, the new Multi-Fuel, poly-cycle type line of engine is convertible after its manufacture merely by changing the fuel burning accessories.

34 FRONT-DUMPING SHOVEL.—Speeder Machinery Corp. announces the "Speedersaurus" shovel attachment, developed for use with Speeder or Link-Belt convertible machines, for handling material that cannot advantageously pass through the bucket, and for sub-grading work where a skimmer might ordinarily be used.

35 GASOLINE POWER HAMMER CABLE ASSEMBLY.—Barco Mfg. Co. A new cable assembly makes operation of the Barco portable gasoline hammer possible with wet battery as well as dry battery.

36 INDUSTRIAL TRUCKS.—Elwell-Parker Electric Co. A compactly built model truck of the center control fork type is the Elwell-Parker F-16 rated 6000 lb. It is built either as a telescoping or non-telescoping truck.

37 MOTOR SPEED INDICATOR.—U. S. Electrical Motors, Inc. New electric remote speed indicator for the U. S. Varidrive motor is offered to provide an accurate and simple means of selecting the operating speed of this motor from a remote point.

38 REFRACTORIES. — Laclede-Christy Clay Products Co. Laclede Furnascote refractory maintenance mixture is a highly refractory, air setting mix, especially recommended for filling in and smoothing up damaged sections which might otherwise require extensive rebuilding or repair.

39 SPEED REGULATOR. — Westinghouse Electric & Mfg. Co. A new form of speed regulator is claimed to hold the speed of a direct-current motor constant within limits from no load to full load. It depends for its response on a flywheel or inertia member sensitive to rate of change of speed and to a member responsive to change in speed, both acting on a single pair of contacts.

40 SPEED CONTROL UNIT. — Reliance Electric & Eng. Co. The Reliance V*S drive is a packaged, all-electric a-c. adjustable-speed drive available for 220, 440 and 550-volt, 3-phase, a-c. circuits, for varying operating speeds over as much as a 12 to 1 range.

41 TRACTOR SHOVEL.—Frank G. Hough Co. announce the special-modified International T-35 and TD-35 tractor shovels of ¾-cu. yd. capacity. These tractors are equipped with special long tracks, six roller truck frames, spring loaded foot clutch, double steering clutches, and reverse fan.

42 WELDING EQUIPMENT. — Lincoln Electric Co. "Surfaceweld A" is a fine grained alloyed powder to be applied with the carbon arc which is claimed to give a smooth, dense, hard (abrasion resistant) surface of approximately Rockwell 54C when properly applied.

43 WELDING EQUIPMENT. — St. Pierre Chain Corp. Triplex Welders' chipper is a drop forged steel chipping hammer, for chipping and breaking rust and scale, having a heavy duty wire brush, for cleaning the surface, mounted rigidly on the top side.

44 WELDING AND HEATING BLOWPIPE.—Linde Air Products Co. Oxweld (type W-26) heavy-duty welding blowpipe is a large-capacity heating blowpipe for welding and heating ranges above those which can be handled by the ordinary blowpipes.

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28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	

Name ..... (Position) .....

Company .....

Street .....

Fuel Conservation of Rotary Lime Kilns

(Continued from page 44)

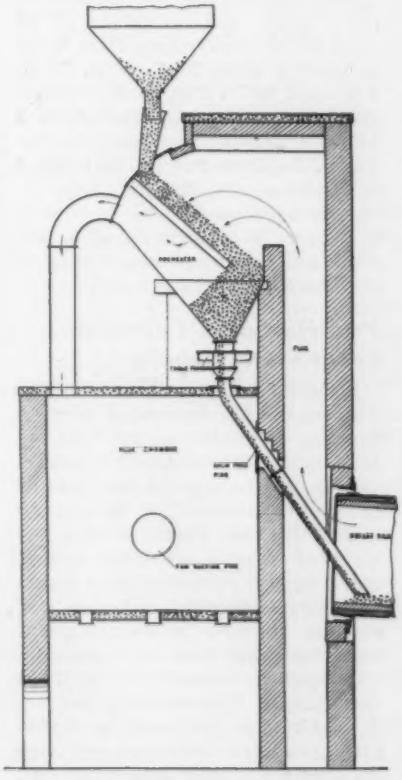
a cooler. With this equipment, lime may be cooled from the temperature of calcination to about 800 deg. F., in the least efficient case, to about 450 deg. F., for the more efficient type. The last item in the heat balance summary which follows is the carbon dioxide which is dissociated at a temperature of 1650 deg. F. In the estimates which follow, the output is assumed to be about 50 tons per day.

		B.t.u.'s
(1) To heat 4000 lb. raw stone from 60 to 212 deg. F., 4000 × 0.22 (212-60 deg.)	=	133,760
(2) To heat 5% of water, 200 lb. from 60 to 212 deg. F., 200 × (212-60 deg.)	=	30,400
(3) To evaporate 200 lb. of water, 200 × 966	=	193,200
(4) To superheat 200 lb. of steam to exit gas temperature of 850 deg. F., 200 × 0.48 (850-212 deg.)	=	61,250
(5) To heat 4000 lb. of raw stone from 212 to 1650 deg. F., the dissociation temperature for CO_2, 4000 × 0.23 (1650-212 deg.)	=	1,322,960
(6) To dissociate calcium carbonate, 4000 × 772	=	3,088,000
(7) To heat 2240 lb. of lime to 2300 deg. F., 2240 × 0.24 (2300-1650 deg.)	=	349,440
(8) Radiation loss from the kiln shell, assuming effective insulation between refractory lining and the kiln tube	=	353,650
Total		5,532,660
(9) Heat in 1760 lb. CO_2 at 1650 deg. F., 1760 × 0.23 (1650-850 deg.)	323,840	
(10) Heat recovered from 2240 lb. hot lime, 2240 × 0.23 (2300-800 deg.)	772,800	1,096,640
Heat required per ton of lime		4,436,020

Pulverized coal of standard quality contains 12,600 B.t.u. per lb., but as the gases leave the kiln at about 850 deg. F. part of this heat escapes with the waste gases and is ineffective. Air required for combustion is about 9 lb. per pound of coal, and allowing for a pound of excess air, the total products of combustion from one pound of fuel would be 11 lb. The heat in one pound of combustion gases at 850 deg. F. may be assumed at 200 B.t.u., the total heat in waste gases is then 11 × 200 or 2200 B.t.u., and the useful heat in one pound of coal is found at 12,600 — 2200 or 10,400 B.t.u. Dividing the estimated figure of the heat required 4,436,020, by 10,400, the fuel consumption is found at 427 lb., and allowing 10 percent for unforeseen contingencies, the consumption of coal is found at 470 lb. per ton of burnt lime. By referring to the heat balance, it may be seen that fuel economy may be effected by more efficient cooling of the burnt lime, reducing the heat lost by radiation from the shell, and utilizing the heat in the waste gases.

In the illustration is shown a cross section of a Stag preheater and cooler installation on a rotary lime kiln. It consists of an inclined grate over which the stone gravitates from an overhead bin. The inclination of the grate is adjustable to suit the angle of repose of the material, and the thickness of the stone on the grate may also be changed in accordance with the grading. The heated stone is collected in a small hopper under the grate and then fed direct into the kiln at the required rate by an automatic feeder. Hot gases passing through the stone are cooled to a temperature which is harmless to the metal grate. The waste gases are exhausted through the stone on the grate by an induced draft fan and the thickness of the stone is adjusted to give a reasonable depression in the fan suction pipe.

Tests indicate that with the preheater and cooler installation, the fuel consumption is 39 lb. per ton of burnt lime with a waste gas temperature of 350 deg. F. as compared with 470 lb. of coal when the waste gas temperature was 850 deg. F., a saving of 68 lb. of coal per ton of lime produced.



Cross section showing method of installing preheater on rotary lime kiln

Quarry Shorts

GILDEA CO., Hollidaysburg, Penn., with plant at Franstown, Penn., is planning to open a new quarry in Bedford county.

•

MASSMAN CONSTRUCTION CO., Kansas City, Mo., contractors for the construction of Grand River dam near Vinita, Okla., report that several changes are being made at the White Bird quarry to speed up operations. These changes, it is anticipated, will increase production from 2500 tons a day to 800 tons per hr. While the changes are being made, some stone was obtained from made, some stone will be obtained from the Anderson Material Co. quarry.

•

WISCONSIN GRANITE CO., near Berlin, Wis., is planning for full production, and will hire about 35 additional men, according to Charles Wincell. The company has a large order for breakwater stone.

•

OLD COLONY CRUSHED STONE CO. and the Old Colony Asphalt Concrete Co., both of Quincy, Mass., have been consolidated and will be operated as the Old Colony Crushed Stone Co. There will be no change in the personnel.

•

THE STONE QUARRIES at Sharpsville, Ohio, will be reopened by Robert Hodson, of Highland, Ohio, who recently took over the properties from Gerald Johnson. The plant is being rebuilt and new machinery installed.

•

AT HILLSBORO, ORE., announcement has been made that county-owned Laurel quarry will be operated by WPA labor using a crew of 15 men. The rock will be used in four Washington county road projects.

•

GLASGOW, KY., has purchased a new quarry property comprising 4½ acres. A WPA crew will open the quarry which replaces a worked out municipal quarry.

•

WPA LABOR is operating a quarry close to Route 20 and near Lisbon, Ohio. The quarry will furnish crushed stone for the $1,250,000 Columbiana County blanket road program.

•

IT IS REPORTED that arrangements have been completed by Scott county, Iowa, and Bettendorf, Iowa, to lease a quarry east of Bettendorf, Iowa, from the Universal Atlas Cement Co. to obtain crushed stone and rip rap stone for use on WPA jobs. The newly-leased quarry was used originally by the old Western States Cement Co. Rock taken from the quarry will be paid for at the rate of 4c per cu. yd.

Rebuilding Cement Mill Destroyed by Fire

SOUTHERN CEMENT CO., Birmingham, Ala., plans to rebuild the mill building and purchase equipment to replace that which was damaged by a fire that caused a loss estimated at $100,000. Stored in the mill building were paper bags, 1000 bbl. of cement and hydraulic lime in addition to valuable processing and packing machinery, according to George C. Walter, vice-president and general manager. All of the damage was covered by insurance. The company makes an hydraulic cement, using hydraulic lime and pulverized slag.

New Cement Plant for South America

COLUMBIA, SOUTH AMERICA, will have a new cement plant which will be built at the city of Madellin. Cia de Marmoles y Cementos del Nare is the name of the company building the plant, and Edgar Allen & Co., Ltd., Sheffield, England, has the contract for the construction. It will have an output of 87,000 tons annually.

Spend $250,000 for Crushing Plant

FLINT COTE CO., New York, N. Y., has started the construction of a $250,000 rock crushing plant at Kremlin, Wis., according to reports. This plant, one of several in various parts of the country, is being transferred from Marquette, Mich. It was indicated that the rock found at Kremlin was more suitable for the finely crushed composition roofing than the type at Marquette. Austin Construction Co., Cleveland, Ohio, is building the plant.

Sand and Gravel Rates In South

THE I. C. C. in fourth section application No. 17596, embracing also fourth section application No. 17666, authorized to establish and maintain on sand, gravel and related articles the lowest rates from origin to destination that may be constructed over any route between the following points on the basis set forth in the applications without observing the long-and-short haul part of section 4. The points affected are over existing routes between points in southern territory described in Southern Class Rate Investigation, 100 I. C. C. 513, and others; from points in Illinois, East St. Louis and south thereof, to points in Mississippi valley territory; and between points in southern territory and Virginia points in trunk line territory, except between points both of which are in Virginia, as described in the application.

Large Aggregate Plant For Santee-Cooper

BECKER COUNTY SAND AND GRAVEL CO., Crosby, Minn., is building a $75,000 sand and gravel plant at Lugoff, S. C., to supply the Santee-Cooper dam project with 225,000 cu. yd. of gravel and 140,000 cu. yd. of sand for concrete construction work. A washing plant 24 ft. wide, 72 ft. long, and 80 ft. high is being built. Materials will be excavated from a 100-acre deposit by means of 2½-cu. yd. draglines, and will be brought to the washing plant with four 12-cu. yd. trucks and a 300-ft. centers conveyor. It is expected that the plant will be ready September 15, to produce 25 carloads per day.

Pacific Coast Concern Increases Capacity

PACIFIC ROCK AND GRAVEL CO., Los Angeles, Calif., is increasing its plant capacity from 300 to 500 tons per hour. When originally built five years ago the design was for an eventual hourly production of 500 tons, so the present increase mainly involves the addition of more screening surface and a method of excavation of higher capacity. A slackline cableway will displace a shovel in the pit and a reduction crusher is to be installed. The plant is located 14 miles from Los Angeles. The company has expanded further and is in the ready-mixed concrete business, operating six Blaw-Knox truck mixers on GMC trucks. Concrete is mixed entirely in transit.

Electrically-Heated Asphalt Plant

FRANKLIN CONTRACTING CO., Newark, N. J., operates a quarry, ready mixed concrete plant, an asphalt distributing plant and two bituminous highway mixing plants, one for sheet asphalt and the other for cold mix. Electric heaters have replaced steam heaters with the result that a more uniformly heated bitumen is making possible a better quality paving material. Cost of operation also has been reduced by hooking the heat and plant circuits to a demand limiter along with the circuit from the company's electrically-operated quarry. This has brought about a lower unit rate for power used at both locations.

Bituminous materials are stored in three 18,000-gal., one 15,000-gal., and one 8000-gal. tanks. In addition there is a 3000-gal. Clarmac Superheater, handled in this country by Easton Car and Construction Co., Easton, Penn. Before the recent change, the tanks were heated by steam at 100-lb. pressure, requiring continuous firing of the boilers. Immersion-type electric heaters and automatic temperature control equipment is now used, and heating is done entirely at night.

Walsh-Healy Act Contracts

THE U. S. DEPARTMENT OF LABOR, Division of Public Contracts, recently issued a statement for the period from September 28, 1936 to June 30, 1939, inclusive, giving the total of contracts awarded under provisions of the Walsh-Healy Act. A total of $2,592,409 for concrete products was awarded for this period, and $3,783,-846 was expended for ready mixed concrete. Cement and products totaled $27,430,677, crushed and broken stone amounted to $8,012,562, and rip-rap stone expenditures were $717,385.

Fiftieth Anniversary of Chicago Bridge & Iron Co.

TO COMMEMORATE its fiftieth anniversary the Chicago Bridge & Iron Co. has published a special issue of its house organ, "The Water Tower," which traces the history of the company and describes its work, its plants, and its personnel. Also included are illustrations, photographs, and the history of the different products manufactured. Among these are bridges, standpipes, tanks and Brooks-Taylor lime putty plants.

California Cement Plant Making Rapid Progress

CONSTRUCTION work in connection with the new Permanente Cement Corp., Los Altos, Calif., has been making rapid progress. The Southern Pacific Railroad recently added a 2½ mile section of track to the plant site which cost about $150,000. It is planned to have the $4,500,000 plant ready by January 1, 1940. Two 12- x 450-ft. kilns will be installed, but future plans call for a third kiln. An injunction suit, brought by Los Altos residents to halt construction, will be heard on September 12.

Western Activity in the Lime Industry

LIME SUPPLY CO., Salt Lake City, Utah, recently started up production of lime with a shaft kiln near this city. H. Gray, Wm. Meyerhoff, and Harry Ohlin are partners in the enterprise.

PETERSEN BROS. LIME CO., Provo, Utah, is planning to add a small rotary lime kiln to their present plant. This is a partnership in which two brothers, Hans and Nels Petersen, are interested.

First Cement Plant For Honduras

PLANS are now going forward to establish a cement plant in Honduras, Central America, according to a consular report. The government of Honduras has approved a concession for the manufacture of cement which is held by a nephew of the President and by a son of the Minister of Education, the raw materials to be taken from a farm near Tegucigalpa owned by the former. At present all cement used in Honduras is imported, chiefly from the United States and Germany. Total cement imports for the fiscal year ended July 31, 1937, aggregated 4327 tons.

Place Half Million Ton Railroad Order

R. G. CLIFFORD CO., contractors who are constructing a portion of the Southern Pacific Railroad relocation of track around the Shasta dam, have signed a contract for 500,000 tons of sand and gravel with Ellis Foster, Cottonwood, Calif. It is reported that the gravel taken from the Foster ranch will be used in the construction of bridge abutments and tunnel lining at the site of the job near Delta, Calif. Mr. Foster will receive five cents per ton, and it is reported that the Southern Pacific will deliver the material at a freight rate of 65c a ton. The R. G. Clifford Co. has started the erection of a washing and screening plant.

Rates on Cement Bags

THE I.C.C., in fourth section application No. 17530, authorized in instances in which departures from the long-and-short-haul provision are lawfully in effect in rates on cement, C.L., from Rapid City, S. D., to points mentioned below, to establish and maintain over the same routes, in the opposite direction, on old (used) cement bags, less than C.L., from points in Colorado, Iowa, Minnesota, Nebraska, North Dakota, South Dakota and Wyoming, as described in the Kipp tariffs, to Rapid City, S. D., and to intermediate points to which rates to Rapid City will be observed as maxima. Rates are to be constructed on the basis as set forth in an appendix to the report, without observing the long-and-short-haul part of section 4. Illustrative of the rates shown in the appendix is the provision that where the rate on cement, C.L., in cents a hundred pounds is 20 and over 19c, the rate on old (used) cement bags in the reverse direction will be 83c; and where the rate is 39c and over 37 the rate on old (used) cement bags in the reverse direction will be 171c.

Special Cements In 1938

BUREAU OF MINES has compiled an interesting report on the production of special cements. Production of high-early-strength portland cement in the United States during 1938 amounted to 3,340,582 bbl., and shipments from the mills, 3,385,523 bbl., valued at $6,247,699, an average of $1.85 per bbl. These figures represent the output of 72 plants. For 1937 the production was 4,192,959 bbl.; shipments, 3,845,314 bbl., valued at $7,134,468, an average of $1.86 per bbl.

Masonry cement of the portland-cement class produced in 1938, as reported by producers for five plants, totaled 84,875 bbl., and shipments from the mills, 88,905 bbl., valued at $124,239, an average of $1.40 per bbl. For 1937, the output of 10 plants amounted to 257,385 bbl., and shipments from the mills, 273,144 bbl., valued at $362,807, an average of $1.33 per bbl. Masonry cement (hydraulic not portland) for use in masonry mortars reported for 32 plants totaled 1,246,263 bbl., and shipments from the mills, 1,225,960 bbl., valued at $1,589,908, an average of $1.30 per bbl.

Output of low and moderate heat cement, including TVA type B portland cement, amounted to 4,132,237 bbl., and shipments from the mills were 3,730,814 bbl., valued at $5,550,369; an average of $1.49 per bbl. These figures represent the output of 40 plants. For 1937, production was 3,169,593 bbl.; shipments from the mills, 3,511,674 bbl., valued at $5,008,217, an average of $1.43 per bbl.

Portland-puzzolan cement, including cement reported as high-silica, produced in 1938 totaled 159,745 bbls., and shipments from mills, 149,142 bbl., valued at $229,441, an average of $1.54 per bbl. For 1937, production amounted to 260,194 bbl.; shipments from the mills, 294,384 bbl., valued at $417,130, an average of $1.42 per bbl.

Oil-well cement was produced in seven plants located in the oil-bearing states of California, Colorado, Texas and Wyoming. Production was 226,769 bbl., and shipments amounted to 220,122 bbl., valued at $457,665, an average of $2.08 per bbl. In 1937, nine plants produced 342,316 bbl.; shipments were 313,064 bbl., valued at $652,960, an average of $2.09 per bbl.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Canada Cement Co., pfd.	$1.25	Sept. 20
Lehigh Portland Cem., pfd.	1.00	Oct. 2
Lone Star Cement Co.	.75	Sept. 29
Lehigh Portland Cem., pfd.	1.00	Jan. 2
Southern Phosphate	.15	Sept. 29
Standard Silica	.10	Aug. 15
U. S. Gypsum Co.	.50	Oct. 2
U. S. Gypsum Co., pfd.	1.75	Oct. 2
Westvaco Chlorine Prod.	.25	Sept. 1

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ALPHA PORTLAND CEMENT CO., Easton, Penn., had net sales amounting to $6,953,737 for the year ended June 30, 1939. This compares with $5,862,225 for the same period ended June 30, 1938.

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STANDARD SILICA CORP., Chicago, Ill., with plant at Ottawa, Ill., reported a net profit of $14,400 for the six months ended June 30, 1939 as against $2546 for a similar period ended June 30, 1938. Net sales for the first six months of 1939 were $130,788.

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NORTH AMERICAN CEMENT CO., New York, N. Y., showed a net loss of $629,854 for the 12 months ended June 30, 1939, after taxes, depreciation, depletion and interest, but before profit on bonds purchased, comparing with a net loss of $792,996 for the 12 months ended June 30, 1938.

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FLORIDA PORTLAND CEMENT CO., Tampa, Fla., had a net profit of $350,665 for the 12 months ended June 30, 1939, before federal taxes, as compared with $184,387 for the similar period ended June 30, 1938. Net sales for the 12 months ended June 30, 1939, were $1,479,398 as against $1,328,494 for the year ended June 30, 1938.

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PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reports a net profit of $117,623 for the quarter ended June 30, 1939, after depreciation, depletion, interest and federal income taxes. This compares with $102,405 for a similar quarter in 1938. The six months earnings in 1939 amounted to $238,313.

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LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, showed a net profit of $335,541 for the first six months of 1939 as compared with $201,740 for a similar period in 1938. These earnings are computed after deducting depreciation, depletion, and federal taxes.

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CONSOLIDATED CEMENT CORP., Chicago, Ill., reports a net income of $145,573 for the year ended June 30, 1939. This compares with a net loss of $57,803 in the 12 months ended June 30, 1938. Net sales for the year ended June 30, 1939, were $1,479,569 as against $1,345,713 for the 12 months ended June 30, 1938. Holders of the company's 15-year first income 6s and income 6 percent notes were notified that interest of 3 per cent would be paid on August 1, 1939.

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PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reports for the six months ended June 30, 1939, a consolidated net loss of $46,728 after all charges, including depletion and depreciation. This compares with a net loss of $106,779 for the corresponding period of 1938.

LONE STAR CEMENT CORP., New York, N. Y., showed a net profit of $923,661 for the quarter ended June 30, 1939, as against $797,134 for a similar period in 1938. Sales for the quarter ended June 30, 1938, totaled $5,651,288 as compared with $5,246,805 for a like period in 1938.

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ALBERENE STONE CORP., OF VA., New York, N. Y., with plant at Damon, Va., reports a net income of $7669 for the first six months of 1939, before federal taxes, as compared with $1654 for the same period a year ago. Net sales for the period ending June 30, totaled $235,845 as against $240,281 for a like period in 1938.

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UNITED STATES GYPSUM CO., Chicago, Ill., has announced that earnings for the quarter ended June 30, were the best in the past decade. Income for this period in 1939 amounted to $2,127,161 as compared with $1,492,871 in 1938. These improved earnings are a reflection of the sharply expanded demand for building materials. Announcement has been made that production has been stepped up another turn at the Port Clinton, Ohio plant. Four turns of six hours each are now working, with the plant running seven days each week.

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NATIONAL GYPSUM CO., Buffalo, N. Y., had a net income for the quarter ended June 30, 1939 of $506,507. This compares with $283,328 for a like period in 1938. Net sales were $6,075,234 in the first six months of 1939 as against $4,440,733 for the first half of 1938.

Preferred stockholders of the company recently approved a long term debenture issue of $5,000,000. The debentures are to be sold to underwriters, bearing interest of not less than 3 percent and not more than 4 percent, and with a maturity of not less than 10 years or more than 20 years. Proceeds are to be used to retire the present 4½ percent debentures due May 1, 1950, and to provide additional funds for added construction at the company's New York plant.

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PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., reports a net profit, before federal taxes, of $264,486 for the 12 months ended June 30, 1939. Last year for this period there was a deficit of $81,600. Net sales for the 12 months ended June 30, were $6,090,347 as compared with $5,840,836 for a similar period ended June 30, 1938.

Eastern Lime Company Buys Illinois Quarry

STANDARD LIME AND STONE Co., Baltimore, Md., with eight plants in the East recently purchased 42 acres from Peoples Gas By-Products Corp., adjoining Joliet road in the village of McCook, Ill., according to a deed recently filed with Cook County recorder.

Concrete Pavement Yardage

AWARDS of concrete pavement for July, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during July	Total sq. yds. during first seven months
Roads	3,819,662	15,942,861
Streets and Alleys	1,893,336	11,047,765
Airports	136,803	418,593
Totals	5,849,801	27,409,219

Open Michigan Cement Packing Plant

UNIVERSAL ATLAS CEMENT Co. was host to several hundred business and civic leaders of southern Michigan at an informal open house on August 15, when the new Muskegon, Mich., storage and packing plant was placed in operation. The plant consists of five storage tanks built of concrete with cone bottoms. The packing room and sack building is of steel frame construction covered with corrugated cement-asbestos roofing and siding.

Cement is shipped in bulk from the Buffington, Ind., plant in the motorship "Steel Chemist" and unloaded by a special Fuller-Kinyon, high-capacity portable unloader. From the storage tanks, cement is loaded in bulk or in bags to cars or trucks for delivery to market.

Cement Shipments Ahead of Production

BUREAU OF MINES figures on cement released August 1, show that in June, 1939, the portland cement industry produced 11,953,000 bbl., shipped 12,715,000 bbl. from the mills, and had in stock at the end of the month, 21,489,000 bbl. Production and shipments of portland cement in June, 1939, showed increases of 13.5 and 16.2 percent, respectively, as compared with June, 1938. Stocks at mills were 4.4 percent lower than a year ago.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 161 plants at the close of June, 1938 and 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	June 1938	June 1939	May 1939	Apr. 1939	Mar. 1939
The Month	49.8	56.5	50.9	45.7	37.4
12 Months	41.0	44.3	43.8	43.5	42.8

Sand Lime Brick Production and Shipments

NINE active sand-lime brick plants reporting for July and ten for June, statistics for which were published in August.

AVERAGE PRICE FOR JULY

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Grand Rapids, Mich.	....	14.00
Iona, N. J.	$11.00	13.50
Milwaukee, Wis.	10.00	12.50
Mishawaka, Ind.	....	11.00
Saginaw, Mich.	10.90	....
Syracuse, N. Y.	14.00	16.00 C/L 18.00 L/C

STATISTICS FOR JUNE AND JULY

	June†	July‡
Production	2,957,610	2,198,650
Shipments (rail)	183,000	153,000
Shipments (truck)	3,420,440	2,570,280
Stock on hand	834,704	612,534
Unfilled orders	2,315,000	1,465,000

† Ten plants reporting: incomplete, one not reporting production, three not reporting stock on hand, and three not reporting unfilled orders.

‡ Nine plants reporting: incomplete one not reporting production, two not reporting stock on hand, and four not reporting unfilled orders.

OBITUARIES

FREDERICK W. OHLEMACHER, vice-president of the Kelley Island Lime and Transportation Co., Cleveland, Ohio, died August 1. He was born in Sandusky and with the company for more than 36 years. His father built the first lime kiln in Sandusky and conducted his business very successfully for more than twenty years until 1899, when he retired and was succeeded by Frederick, who later became general manager of the Kelley Island company in Sandusky and vice-president of the company.

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WILLIAM T. HACKNEY, prominent phosphate operator of Columbia, Tenn., died July 11 at the age of 60.

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ADAM L. BECK, president of the Great Lakes Portland Cement Corp., Buffalo, N. Y., died August 10. He was 77 years of age and during his career had organized, constructed and headed lime companies and cement companies in three states. He was born in Huntington, Ind.

As a youth, Mr. Beck worked in his father's lime plant and was later

Adam L. Beck

associated with his father. In 1893 he organized and was elected director of the Mitchell Lime Co., Mitchell, Ind. In 1906 he sold his interests in this firm and organized the Oklahoma Portland Cement Co.

Next he organized the Indiana Portland Cement Co. at Greencastle, which erected a $2,200,000 plant. He served as president and director until 1925, when he went to Buffalo to form the Great Lakes firm and build its plant at a cost of $4,500,000.

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RALPH E. MCLEAN, president of the East St. Louis Stone Co., East St. Louis, Ill., died July 23 from a paralytic stroke. He was 63 years of age and had been active in the affairs of the East St. Louis Stone Co. for over 37 years, having started as a clerk. He rapidly advanced to secretary and then general manager and president over a period of two years. His son, M. E. McLean, is general manager of the company.

Ralph E. McLean

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B. COWDEN, secretary-treasurer of the Southern States Portland Cement Co., Rockmart, Ga., died August 12 at the age of 76. He had been connected with the Southern States Portland Cement Co. for 35 years and was a native of Piedmont, Ala.

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HERMAN A. MILLER, who has been president of the Diamond Slate Co., Pen Argyle, Penn., died July 22 at the age of 68.

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ARCHIE L. BROWNLEE, owner and manager of the Yuba River Sand Co., Marysville, Calif., died August 3. He was a native of Brandon, Manitoba, Canada and 57 years of age.

New Ready Mixed Plants

THE CENTRAL ENGINEERING CO., Davenport, Iowa, will place in operation a complete central mixing plant for use on the Santee-Cooper project near Charleston, S. C. It is a Blaw-Knox fully automatic type.

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CRISS & SHAVER, Huntington, W. Va., has erected a complete Blaw-Knox truck mixer loading plant for aggregates and cement and has purchased six 2½-cu. yd. Trukmixers. This equipment is being used for the construction of a protective river wall at Huntington.

Block Company Making Ready Mixed Concrete

OTTO LADWIG & SONS, INC., Milwaukee, Wis., well-known manufacturer of concrete blocks, has gone into the ready mixed concrete business. Three 2-cu. yd. Smith-Mobile truck mixers were recently placed in service. This company is also a large dealer in cement, lime, sand and gravel and other building materials.

PRICES BID
Contracts Let

MARION, OHIO: Baldauf & Schlientz, Inc., was awarded contract for 2000 bbl. of portland cement with a bid of $2.40 per bbl. The city will purchase rip-rap stone from J. M. Hamilton & Sons, who submitted a bid of 10c a ton for 5000 tons of rip-rap in ledges and 32c a ton for 5000 tons of crushed rip-rap.

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JOPLIN, MO.: Independent Gravel Co. was awarded a contract for paving Picher Avenue with asphalt concrete on a bid of 80c a sq. yd.

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COLUMBIA, TENN.: Franklin Limestone Co. is selling calcium silicate slag to farmers to "sweeten" the soil at a price of 60c a ton, loaded on trucks at the plant. The delivered price ranges with the distance from the plant, and the slag will be spread on the ground at an extra price of 25c a ton.

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CUBA, MO.: Gildehaus Brothers have contracted with the Crawford County Agricultural Association to deliver at least 4000 tons of agricultural limestone to any point in the county at a price of $1.50 per ton delivered.

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QUINCY, ILL.: Missouri Gravel Co., Moline, Ill., was awarded a contract for 7970 cu. yd. of maintenance gravel at $2.38 per cu. yd.

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MILWAUKEE, WIS.; Trempealeau Co. was awarded a contract for 8800 cu. yd. of crushed stone or gravel at $1.21 per cu. yd. to surface the Arcadia-Independence Road.

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FLORENCE, ALA.: The Tennessee Valley Authority has ordered the following materials to be used at the fertilizer plant at Muscle Shoals: 15,000 tons rock phosphate sand from International Agricultural Corp., New York, N. Y., at $4.70 per ton and 30,000 tons at $3.70 per ton; 3000 tons rock phosphate at $4.10 per ton from the Tennessee Products Corp., Nashville.

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NORMAN, OKLA.: Louis C. Bryant with a bid of 84c a ton on 1600 tons of highway specification sand was awarded the contract to supply the materials for the WPA drainage ditch project to be constructed through Norman.

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BLAIR, NEB.: Gravel for use in the building of pavement under a WPA project will be purchased by the city from Leslie Peak and Howard Clausen for 73c per ton delivered on the job. The Rivett Lumber & Coal Co. will furnish the cement at 69½c per sack less 10c for each returned sack.

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ZANESVILLE, OHIO: Contract to furnish 2500 tons of crushed limestone for the city street improvement program was awarded to George Froelich at $1.29 per ton.

Building Large Gravel Plant for Shasta

COLUMBIA CONSTRUCTION CO., San Francisco, Calif., low bidder on the contract calling for 10 million tons of sand and gravel aggregates for construction of Shasta dam is expected to start work on its plant in North Redding, Calif., within a short time. The company was low bidder for the aggregates with a figure of $4,413,520. S. J. Davis, who will be general superintendent of the job, advised newspaper men that it will require 90 days to complete the plant. Gravel will be needed next March when concrete pouring starts. At the height of construction about 480 cars a day will be needed.

News of the Industry

New Incorporations

Lannan Gravel & Supply Co., Lannon, Wis., has been incorporated by Alf. and Clara Struble and Mathew Schneider with a capital of 100 shares of no par value.

Texas Graphite, Inc., Llano, Tex., has been granted a charter. Incorporators are W. A. Letson, Joseph Darnell, and Alfred Mueller.

Waynesboro Concrete Products Co., Inc., Waynesboro, Va., has been incorporated with a maximum capital of $50,000. W. G. Mathews is president.

United Concrete Corp., Boston, Mass., has been granted a charter. Capital is $20,000 and incorporators are Joseph J. Rice, Kathryn Aylott, and Gertrude Riley.

Chapman's Concrete Works, Inc., Holly Hill, is the name of a new Florida corporation. The directors are J. H. Chapman, who is also president, T. F. Lance, and Lewis F. Law. Capital stock is 50 shares of $100 par value.

Wilmore Stone Co., Nicholasville, Ky., with capital stock of $1000, has been granted a charter. Incorporators are S. S. and Katherine M. Coleman and R. L. Bronaugh.

Massachusetts Concrete Materials Co., Saugus, Mass., has been incorporated by Paul Caputo, Ezra Andelman and David Goulis with a capital of 300 shares no par value.

Superior Stone Co., Raleigh, N. C., has been granted a charter. Authorized capital stock is $400,000, subscribed stock $800, by W. H. Ragland, E. U. Ragland, W. T. Ragland, H. M. Shaw, Robert B. Shepard, R. B. Arthur, E. B. Young, and L. B. Shupping.

Manufacturers

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., announces that William H. Dunn, comptroller and assistant treasurer, has been elected secretary to succeed the late Morton F. Judd.

Hercules Powder Co., Wilmington, Del., announces the appointment of Dr. Emil Ott as director of research. He was formerly head of the research department at the experiment station but will not be in charge of all company research.

Chiksan Tool Co., Fullerton, Calif., has appointed Crane Co. national distributors of the Chiksan Line.

Riehle Testing Machine Division of the American Machine and Metals, Inc., East Moline, Ill., has appointed Wayne Mendell to supervise its sales activities in the Chicago area with headquarters at 35 East Wacker Drive.

Lidgerwood Manufacturing Co., Elizabeth, N. J., recently honored Jed S. Foster, vice-president and chief engineer, at a testimonial dinner in the Winfield Scott Hotel for fifty years of active service with the company.

Link-Belt Co., Chicago, Ill., has organized the Link-Belt Speeder Corp., a wholly-owned subsidiary but operated independently, with headquarters at 301 West Pershing Road, Chicago, for the manufacture and sale of power-operated excavating and materials handling shovels, draglines, cranes, including a full line of track-type locomotive cranes. Officers are Alfred Kauffman, chairman of the board; T. M. Deal, president; Walter Baker, vice president; W. C. Carter, vice president, and R. E. Kellogg, treasurer.

Hardinge Co., Inc., York, Penn., reports that Bertrand Robinson, who has been closely and actively identified with various metallurgical and operating activities for some years, will represent it in Eastern Canada, with headquarters in Toronto.

Hewitt Rubber Corp., Buffalo, announces the expansion of its Dallas, Tex., warehouse facilities, adding 2500 sq. ft. of floor space, making a total of 7500 sq. ft. now in service.

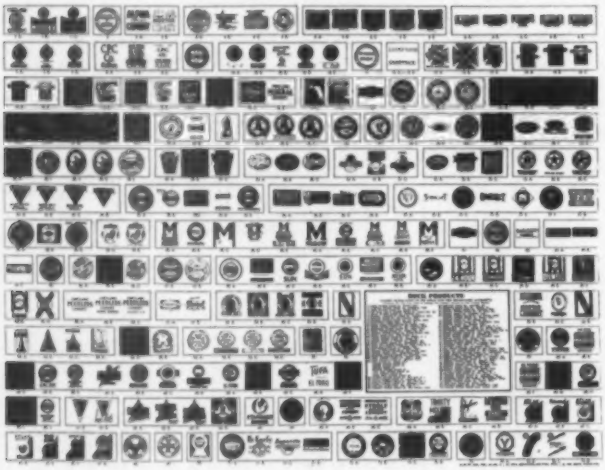
Thermoid Co., Trenton, N. J., announces the following additions to its organization: Newell A. Perry, Jr., to the laboratory staff as a research chemist; James E. Harrah has been placed in charge of the molded hose department; and Charles Mudd has also been added to the laboratory staff to work on compounding and chemical research.

Babcock & Wilcox Tube Co., Beaver Falls, Penn., has appointed Luke E. Sawyer, formerly assistant general superintendent, general superintendent.

Carl Lager, president of Morris Machine Works, Baldwinsville, N. Y., and one of the nation's foremost designers of pumping machinery, steam engines and hydraulic dredges, died July 17. He was about to celebrate his fiftieth anniversary in the employ of Morris Machine Works, where he advanced successively as chief engineer, vice-president, general manager, and president.

August Issue Scores

THE SENSATION OF THE CEMENT INDUTSRY



The Trade Mark Insert

"Congratulations," "We are very anxious to receive 12 extra copies," "Most attractive . . . 15 extra copies for our Division offices," "Splendid piece of work," "Two extra copies for framing."

Letters like these are pouring in from everywhere—grateful acknowledgement of Rock Products' service to the industry.

The original press run was quickly exhausted. Most of the additional order is gone but we still have a few—yours on request. Size 22"x17". Full color.

THE SPECIAL CEMENT SECTION

Progress in the Cement Industry

Pozzolana Cements
Long Conveyors and Diesel Trucks Cut Quarry Costs
Making an Industry Dustless
Instrument Control in the Manufacture of Cement
Science Applied to Control in the Quarry
How Many Cements Needed?
Special Cements
Fuel Selection-Testing
Electrification Speeds Up Cement Mill Improvements

32 Pages Exclusively for the Cement Industry

Every page worth more than its weight in gold to the plant operators judging from their comments:

"Just the stuff we want," "The only publication which gives us helpful information," "We're dropping our subscriptions to other cement papers."

A glance at the list of articles in this Cement Section shows why Rock Products is "The Industry's Recognized Authority."

Rock Products

Smash Hit ★ ★ ★ ★

Beginning with this August issue the publishers present Rock Products in a brand new "Full dress"—new type faces throughout — modern format — highest quality ink — improved enamel paper — more and larger illustrations — short articles.

Rock Products' editorial policy continues unchanged — "A journal of the utmost USEFULNESS to the industry it serves."

Even though the August issue was our Annual Cement Number every major branch of the rock products and concrete products field was covered. Month after month without fail every branch is represented assuring 100% reader interest.

THE REPAIR PARTS ARTICLE

A Two-Fold Service

"Sensible advice to equipment buyers," "Greatly helps the cause of manufacturers who suffer most from the competition of small local shops and hardware dealers," "All manufacturers will thank you for carrying on this good work."

These typical comments show how equipment manufacturers and plant operators alike can profit from this article entitled "Where to Buy Repair Parts." Operators are assured of low installation cost and maximum service while manufacturers are impressed with the importance of repair part business and their duty to advertise their services.

This is another example of Rock Products' service and another reason why Rock Products is the most powerful advertising medium in the industry.

Founded on Service

Classified Directory of Advertisers

For alphabetical index see page 96

Abrasion Resisting Plates
Frog, Switch & Mfg. Co.

Aerial Tramways
American Cable Co.
Hazard Wire Rope Co.
Jeffrey Mfg. Co.
Leschen, A. & Sons Rope Co.
Link Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.

Agitators
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hetherington & Berner, Inc.
Ransome Concrete Machy. Co.
Smidth, F. L. & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Company
Norberg Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Company
Roebling's, John A., Sons Co.

Air Heaters
Westinghouse Elec. & Mfg. Co.

Air Separators
Blaw-Knox Co.
Combustion Engr. Corp.
Gay Rubert M. Div.
Link-Belt Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Company

Alloys (Metal)
Chicago Steel Foundry Co.
Frog, Switch & Mfg. Co.

Arresters, Lightning
General Electric Co.

Ash & Refuse Handling Equipment
Barber-Greene Co.
Easton Car & Construction Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Easton Car & Construction Co.
Hetherington & Berner, Inc.
Koehring Co.
Ransome Concrete Machy. Co.
Traylor Engr. & Mfg. Co.

Axles
Eagle Iron Works
Easton Car & Construction Co.

Babbit Metal
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Ryerson, Jos. T. & Sons, Inc.
Westinghouse Elec. & Mfg. Co.

Backdiggers
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Bag Cleaning Machines
Link-Belt Co.

Bagging Machines
Smidth, F. L., & Co.

Bag Ties
Wickwire-Spencer Steel Co.

Balers or Bundling Machines (Sack)
Besser Mfg. Co.

Balls (Grinding)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Bar & Angle Benders & Cutters
Ransome Concrete Machy. Co.

Barges
Eagle Iron Works

Batchers (Weighing and Measuring Volume)
Besser Mfg. Co.
Blaw-Knox Co.
Fuller Company
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Batteries
Goodyear Tire & Rubber Co.

Battery Chargers
General Electric Co.
Westinghouse Electric & Mfg. Co.

Bearings (Anti-Friction)
Eagle Iron Works
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.

Bearing Metals
Allis-Chalmers Mfg. Co.
Robins Conveying Belt Co.
Westinghouse Elec. & Mfg. Co.

Bearings (Roller)
Easton Car & Construction Co.
Flexible Steel Lacing Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bearings (Tapered Roller)
Link-Belt Co.

Belt Cutting Machines
Flexible Steel Lacing Co.

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engr. Works

Belting (Conveyor & Elevator)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Goodyear Tire & Rubber Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Belting (Transmission)
Bacon, Earle C., Inc.
Goodyear Tire & Rubber Co.
Link-Belt Co.
Smidth, F. L., & Co.
Westinghouse Elec. & Mfg. Co.

Belting (Metal)
Wickwire-Spencer Steel Co.

Belting (Wire)
Wickwire-Spencer Steel Co.

Belting (V-Type)
Allis-Chalmers Mfg. Co.
Goodyear Tire & Rubber Co.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bin Gates
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Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Fuller Company
Gay, Rubert M. Div.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Gay, Rubert M. Div.
Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Marietta Concrete Corp.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Bin Indicators
Fuller Company
Merrick Scale Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Blasting Cap Crimpers
Ensign-Bickford Co.

Blasting Supplies
Ensign-Bickford Co.

Block Machines, Building (Concrete)
Anchor Concrete Machinery Co.
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Kent Machine Co.
Multiplex Concrete Machy. Co.

Blocks (Pillow)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Block Racks
Kent Machine Co.

Blocks (Sheave)
American Hoist & Derrick Co.
Link-Belt Co.
Pioneer Engineering Works
Roebling's, John A., Sons
Sauerman Bros., Inc.

Blowers
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
American Hoist & Derrick Co.
Combustion Engineering Co.

Brick Machines and Molds
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Buckets (Clamshell, Crab and Orange Peel)
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Conveyor & Elevator)
Allis-Chalmers Co.
Bacon, Earle C., Inc.
Chicago Steel Foundry Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jaeger Machine Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works
Ransome Concrete Machy. Co.
Robins Conveyng Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Buckets (Dragline & Slackline)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co.
Link-Belt Co.
Pioneer Engineering Works
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.

Buckets (Dump)
Dempster Bros., Inc.
Jaeger Machine Co.

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Bulk Cement Batching Plants
Heltzel Steel Form & Iron Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
Westinghouse Elec. & Mfg. Co.

Cable (Electric)
General Electric Co.

Cableways
American Cable Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Link-Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Sauerman Bros., Inc.
Wickwire-Spencer Steel Co.

Calcining Equipment
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Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Capacitators
General Electric Co.
Westinghouse Electric & Mfg. Co.

Capstans
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Car Couplings and Hitches
Easton Car & Construction Co.
Macwhyte Co.

Car Dumpers
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Car Pullers & Movers
American Hoist & Derrick Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Industrial, Quarry, Dump, Concrete, Block, etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Multiplex Concrete Machy. Co.
Ransome Concrete Machy. Co.
Traylor Engr. & Mfg. Co.

Car Wheels
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.

Cars (Remote Control)
Westinghouse Elec. & Mfg. Co.

Carts
Blaw-Knox Co.
Jaeger Machine Co.
Link-Belt Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chicago Steel Foundry Co.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Colors
Mepham, Geo. S., Corp.

Cement Plants
Allis-Chalmers Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

"Since this Gulf Engineer recommended

GULF HARMONY OIL

(*Above*) Actual photograph of a Gulf lubrication engineer consulting with the plant engineer regarding the use of Gulf Harmony Oil for air cylinder and bearing lubrication of their large battery of air compressors.

(*Right*) A reliable supply of compressed air is a necessity in quarrying granite. This big granite quarry not only safeguards the operation of their air compressors with Gulf's higher quality lubricants, but depends on the recommendations of the Gulf engineer for the proper lubrication of air drills, hoists, and all other equipment.

"THE Gulf engineer has given us valuable assistance with our air compressors," says this plant engineer. "Since we adopted his recommendations, we have had no more valve trouble or other common operating difficulties which might be attributed to improper lubrication."

Are you looking for the right answers to such questions as these: What type of oil is best for our compressors? What viscosity oil should we use? What quantity should they be fed? Ask the Gulf engineer to look over your equipment and give you recommendations which will cover those points and insure safe, efficient operation. There is no charge for this service, so why not take advantage of it at once?

Gulf's higher quality oils and greases are quickly available to you through more than 1100 warehouses in 28 states from Maine to Texas. Write or 'phone your nearest point of distribution. Gulf Oil Corporation—Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

ALSO A COMPLETE LINE OF FUEL AND FURNACE OILS

Classified Directory (Cont.)

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.

Chain (Conveyor & Elevator)
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Chain (Dredge & Shovel)
Bucyrus-Erie Co
Jeffrey Mfg. Co.
Link-Belt Co.

Chimney Block Machine & Molds
Besser Co.
Multiplex Concrete Machy. Co.

Chutes (Bin, Concrete, etc.)
Allis-Chalmers Mfg. Co
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Eagle Iron Works
Fuller Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works
Ransome Concrete Machinery Co.
Robins Conveying Belt Co
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
Goodyear Tire & Rubber Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Circuit Testers
General Electric Co.
Westinghouse Electric & Mfg. Co.

Clarifiers
Jeffrey Mfg. Co.
Link-Belt Co.
Westinghouse Electric & Mfg. Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Lewistown Fdry. & Machy. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engineering Works, Inc.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Westinghouse Elec. & Mfg. Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg Co.
Austin-Western Road Machy. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co.
Ransome Concrete Machy. Co.

Control Systems (Temperature, Pressure)
Westinghouse Elec. & Mfg. Co.

Controllers (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Conveyors (Belt)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Foundry Co.
Fuller Co.
Diamond Iron Works, Inc.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Co.
Raymond Pulverizer Div.

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Diamond Iron Works, Inc.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.

Conveyors (Screw)
Besser Mfg. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Trolley)
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

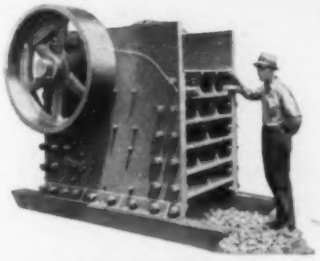
Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Correcting Basins
Smidth, F. L., & Co.

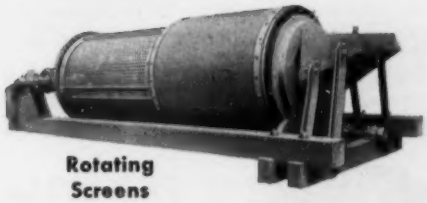
. . . ENGINEERED TO MAKE YARDAGE COSTS TUMBLE

No. 100 Portable Crushing and Screening Plant

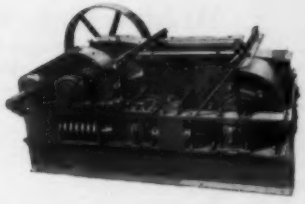


No. 1838 Heavy Duty Crusher

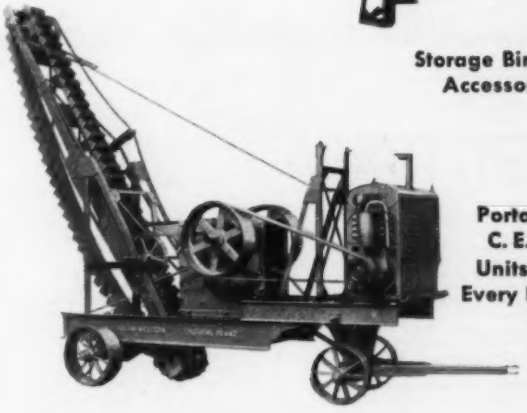
Storage Bins and Accessories



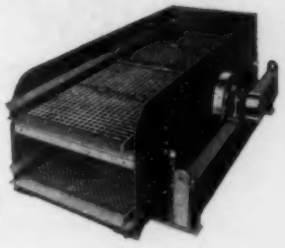
Rotating Screens



No. 3018 Roll Crusher



Portable C. E. P. Units for Every Need



Two-Deck Gyrating Screen

Austin-Western Crushing, Screening and Storage Equipment . . . built to the exacting specifications of experienced crusher engineers . . . includes sizes and types best suited to every location, operating condition, and capacity requirement.

Performance records under the widest variety of pit and quarry conditions have demonstrated the money-saving value of the design and construction advantages of A-W Equipment. All units are engineered to operate smoothly and economically at higher speeds—to produce a larger output of accurately sized stone. As a result, users everywhere report substantial savings over equipment formerly used.

Operators of both stationary and portable plants will find it decidedly worth while to investigate the cost-saving A-W design and construction features . . . and to draw on the broad experience of A-W engineers in planning a plant layout that will assure delivery of accurately sized material at the job at the lowest possible cost. The Austin-Western Road Machinery Co., Aurora, Illinois.

AUSTIN-WESTERN

Motor Graders
Roll-A-Planes
Rollers
Snow Plows
Crushing and Screening Plants
Washing Plants
Blade Graders
Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders
5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

Classified Directory (Cont.)

Couplings (Flexible & Shaft)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel, Electric, Gasoline, Steam)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Cranes (Truck)
Link-Belt Speeder Corp.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Traylor Engr. & Mfg. Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw & Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Wks. Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers Reduction
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Wks. Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing & Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Rogers Iron Wks. Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Dedusters
Blaw-Knox Co.

Dehydrators
Pioneer Engineering Works, Inc.

Derricks
American Hoist & Derrick Co.
Hayward Co.

Detonators
Ensign-Bickford Co.

Dewatering Equipment
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.

Disintegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.

Dragline & Cableway Excavators
American Cable Co.
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.
Wickwire-Spencer Steel Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Works
Hetherington & Berner, Inc.

Classified Directory (Cont.)

Dredge Hulls
Eagle Iron Works

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.

Dredge Sleeves
Hetherington & Berner, Inc.

Drilling Accessories
Bucyrus-Erie Co.

Drill Bits
Bucyrus-Erie Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt Chain & Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Westinghouse Elec. & Mfg. Co.

Drives (Short-Center)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Buell Engineering Co., Inc.
Raymond Pulverizing Div.
Smidth, F. L., & Co.

Dust Collecting Bags
Blaw-Knox Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.

Electric Cables
General Electric Co.

Electric Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.
Westinghouse Elec. & Mfg. Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Elevators
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Fdry. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Fuller Co.
Gay, Rubert M., Div.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gas, Kerosene & Oil)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engr. Co.
Raymond Pulverizer Div.

Fans
Blaw-Knox Co.
General Electric Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Westinghouse Elec. & Mfg. Co.

Feeders
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Kent Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.
Westinghouse Elec. & Mfg. Co.

Filter Cloth
Roeblings, John A., Sons Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Forgings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Laughlin, Thomas, Inc.

Frogs & Switches
Easton Car & Construction Co.
Frog, Switch & Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Fuels (Diesel)
Texas Co.

Furnaces (Heat Treating, Electric)
General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Fuses (Detonating & Safety)
Ensign-Bickford Co.

Fuses (Electric)
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Galvanometers
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gasoline
Gulf Refining Co.
Texas Co.

Gas Producers
Blaw-Knox Co.

Gaskets
Goodyear Tire & Rubber Co.

Gear-Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Link-Belt Co.
Westinghouse Elec. & Mfg. Co.

Gears
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Classified Directory (Cont.)

Generator & Motor Generator Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
Nordberg Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Glass Sand Equipment
Lewistown Fdry. & Mach. Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

Grating
Blaw-Knox Co.
Eagle Iron Works

Grease
Bacon, Earle C., Inc.
Gulf Refining Co.
Texas Co.

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perf. Co.
Tyler, W. S., Co.

Guns
Hetherington & Berner, Inc.

Gypsum Plants
Traylor Engr. & Mfg. Co.

Hangers, Anchors & Inserts (Concrete)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Westinghouse Elec. & Mfg. Co.

Haulage Systems (Electric)
General Electric Co.
Jeffrey Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Haulage Systems (Remote Control)
Dempster Bros.
General Electric Co.
Koehring Co.
Westinghouse Elec. & Mfg. Co.

Heaters (Bitumen)
Easton Car & Construction Co.

Hoists (Chain, Electric, Skip, Portable, Air, etc.)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Mfg. Co.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Easton Car & Construction Co.
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Hoppers
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Gay, Rubert M., Div.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Hose (Air, Drill, Water, Steam, Sand Suction & Discharge)
Dixie Machinery Co.
Goodyear Tire & Rubber Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.

Hydrators
Blaw-Knox Co.
Traylor Engr. & Mfg. Co.

Jigs (Sand & Gravel)
Allis-Chalmers Mfg. Co.
Traylor Engr. & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kiln Burners
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners
Traylor Engr. & Mfg. Co.

Kiln Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Steel Foundry Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Kilns (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Vertical)
Blaw-Knox Co.

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.
Westinghouse Electric & Mfg. Co.

Lift Trucks
Besser Mfg. Co.

Lime Handling Equipment
Combustion Engr. Corp.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Lime Plants
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Blaw Knox Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Loaders (Boat)
Fuller Co.
Link-Belt Co.

Loaders (Box Car)
Barber-Greene Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Loaders (Car, Truck, Bin & Hopper)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Universal Road Machy. Co.

Loaders (Underground)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Locomotive Stack Netting
Tyler W. S., Co.

Locomotives (Diesel-Electric)
Lima Locomotive Works (Loco. Div.)
Westinghouse Electric & Mfg. Co.

Locomotives (Electric, Trolley & Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Loco. Div.)
Westinghouse Elec. & Mfg. Co.

Locomotives (Gasoline & Gas-Electric)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Wks., Inc. (Loco. Div.)
Westinghouse Elec. & Mfg. Co.

Locomotives (Kerosene)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Oil & Oil-Electric)
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives (Steam)
Lima Locomotive Works, Inc. (Loco. Div.)

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Magnetic Separators
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Westinghouse Elec. & Mfg. Co.

Magnets
General Electric Co.

Classified Directory (Cont.)

Manganese Steel Parts
Bacon, Earle C., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.

Material Handling Equipment
Austin-Western Rd. Machy. Co.
Barber-Greene Co.
Diamond Iron Works
Fuller Co.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.
Westinghouse Elec. & Mfg. Co.

Mechanical Rubber Goods
Goodyear Tire & Rubber Co.

Mill Liners
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mill Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mills, Grinding (Ball, Compartment, Emery, Hammer, Pug, Rod, Roll, Tube, etc.) (See Pulverizers also)
Allis-Chalmers Mfg. Co.
American Puverizing Co.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mortar Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Nozzles (Washing)
Link-Belt Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Cutting)
Texas Co., The

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The

Outdoor Lighting Equipment
General Electric Co.

Packing
Goodyear Tire & Rubber Co.

Pallets (Steel & Wood)
Anchor Concrete Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Wks.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.

Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pjoneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Pinions
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co., The
General Electric Co.
Jeffrey Mfg. Co., The
Link-Belt Co.
Westinghouse Elec. & Mfg. Co.

Pipe
Frog, Switch & Mfg. Co., The
Hetherington & Berner, Inc.

Pipe Fittings
Hetherington & Berner, Inc.

Pipe, Forms & Machine (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Plaster Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Diamond Iron Works, Inc.
Eagle Iron Wks.

Power Transmission Machinery
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Westinghouse Elec. & Mfg. Co.

Power Units
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Pulleys
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Westinghouse Elec. & Mfg. Co.

Pulverizer Parts
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Combustion Engr. Corp.
Dixie Machy. Corp.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Hetherington & Berner

Pumps (Dry Pulverized Material)
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Slurry)
Allis-Chalmers Mfg. Co.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pump, Slurry, Valves
Fuller Co., The
Wilfley, A. R., & Sons, Inc.

Pumps (Vacuum)
Allis-Chalmers Mfg. Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Water)
Allis-Chalmers Mfg. Co.
Jaeger Machine Co.
Westinghouse Elec. & Mfg. Co.

Pyrometers
Westinghouse Elec. & Mfg. Co.

Railway Equipment
Easton Car & Construction Co.
General Electric Co.

Railways (Electric)
General Electric Co

Rectifiers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Recuperators
Traylor Engr. & Mfg. Co.

Refractories
Smidth, F. L., & Co.

Regulators (Voltage)
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Classified Directory (Cont.)

Rewashers (Screw)
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

Rheostats
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Rope (Transmission)
Allis-Chalmers Mfg. Co.

Sand Drags
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

Sand and Gravel Plants
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Sand Lime Brick Machinery
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.

Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engineering Wks.

Sand Settling Tanks
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

Scales (Hopper)
Blaw-Knox Co.

Scrapers (Power Drag)
American Hoist & Derrick Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co., The
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Sauerman Bros.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perforating Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Screen Parts
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Pioneer Engr. Wks.
Screen Equipment Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Rogers Iron Wks. Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Rd. Machinery Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons, Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Roebling's, John A., Sons Co.
Robins Conveying Belt
Roebling's, John A., Sons Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Rd. Machinery Co.

Screens (Rotary)
Link-Belt Co.
Smith Engr. Wks.

Screens (Scalping)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Roebling's John A., Sons Co.
Rogers Iron Wks. Co.
Screen Equipment Co.
Smith Engr. Wks.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Rogers Iron Wks. Co.
Smith Engr. Wks.
Tyler, W. S., Co.

Seal Rings
Traylor Engr. & Mfg. Co.

Semi-Trailers, Quarry (Side & End Dumping)
Easton Car & Construction Co.

Shafting
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.

Classified Directory (Cont.)

Jeffrey Mfg. Co.
Link-Belt Co.

Shale Planers
Eagle Iron Works

Sheaves
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Hetherington & Berner
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Ransome Concrete Machinery Co.
Roebling's, John A., Sons Co.
Sauerman Bros.
Westinghouse Electric & Mfg. Co.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air Electric, Gasoline, Gas-Electric, Oil, Steam)
American Hoist & Derrick Co.
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Shovels (Tractor)
Austin-Western Rd. Machy. Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Shovels (Truck)
Link-Belt Speeder Corp.

Shovels (Underground)
Allis-Chalmers Mfg. Co.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S.

Silos (Storage)
Blaw-Knox Co.
Marietta Concrete Corp.
Smidth, F. L., & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.
Easton Car & Construction Co.

Slakers (Rotary)
Traylor Engr. & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Smidth, F. L., & Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Traylor Engr. & Mfg. Co.

Speed Reducers (Gear, etc.)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Westinghouse Electric & Mfg. Co.

Spouts
Jeffrey Mfg. Co.
Link-Belt Co.
Ransome Concrete Machinery Co.
Traylor Engr. & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Pioneer Engr. Wks.

Standpipes
Ross Screen & Feeder Co.

Steel (Abrasive-Resisting)
Ryerson, Jos. T., & Son, Inc.

Steel (Special Alloy)
Chicago Steel Foundry Co.

Stokers
Combustion Engr. Co., Inc.
Link-Belt Co.
Westinghouse Electric & Mfg. Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Tachometers
General Electric Co.
Westinghouse Electric & Mfg. Co.

Tampers (Power & Hand)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.

Tanks (Air, Storage, etc.)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Eagle Iron Wks.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

Testing Instruments
Westinghouse Electric & Mfg. Co.

Tires & Tubes
Goodyear Tire & Rubber Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track and Track Equipment
Besser Mfg. Co.
Nordberg Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial, Quarry)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co.
Easton Car & Construction Co.
Hug Co.
Koehring Co.
Link-Belt Speeder Corp.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Trench Hoes
Link-Belt Speeder Corp.

Trucks (Agitator)
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

Truck Bodies (Dump)
Commercial Shearing & Stamping Co.
Dempster Bros.
Easton Car & Construction Co.
Hug Co.

Trucks (Dump)
Hug Co.

Trucks (Electric)
Easton Car & Construction Co.

Trucks (Gas-Electric)
Easton Car & Construction Co.

Trucks (Industrial)
Easton Car & Construction Co.

Trucks (Mixer)
Blaw-Knox Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Smidth, F. L., & Co.

Turbines
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Classified Directory (Cont.)

Turnbuckles
Macwhyte Co.

Turntables (Industrial)
Easton Car & Construction Co.

Unloaders (Car, Bin, Truck, etc.)
Barber-Greene Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Universal Road Machinery Co.

Unloaders (Boat)
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Universal Rd. Machinery Co.

Unloaders (Pneumatic)
Fuller Co.

Unloaders (Underground)
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Tyler, W. S., Co.

Vibrating Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Eagle Iron Works
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.
Pioneer Engineering Wks.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Easton Car & Construction Co.
Koehring Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel & Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

Weighing Equipment
Blaw-Knox Co.
Fuller Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Welding and Cutting Equipment
General Electric Co.
Ransome Concrete Machy. Co.
Roebling's, John A., Sons Co.
Westinghouse Electric & Mfg. Co.
Wickwire-Spencer Steel Co.

Welding Rods
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.
Westinghouse Electric & Mfg. Co.
Wickwire-Spencer Steel Co.

Welding Wire
Hazard Wire Rope Div.
Roebling's, John A., Sons Co.
Westinghouse Electric & Mfg. Co.

Winches
American Hoist & Derrick Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

Wire (Copper, Iron & Steel)
General Electric Co.
Roebling's, John A., Sons Co.
Westinghouse Electric & Mfg. Co.
Wickwire-Spencer Steel Co.

Wire (Electric)
General Elicertic Co.
Roebling's, John A., Sons Co.
Westinghouse Electric & Mfg. Co.
Wickwire-Spencer Steel Co.

Wire Rope
American Cable Co.
Hazard Wire Rope Co.
Leschen A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Clips
American Cable Co.
American Hoist & Derrick Co.
Hazard Wire Rope Co.
Leschen A., & Sons
Laughlin, Thomas, Inc.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Fittings
American Cable Co.
American Hoist & Derrick Co.
Hazard Wire Rope Co.
Leschen A. & Sons, Rope Co.
Laughlin, Thomas, Inc.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Hooks
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American Hoist & Derrick Co.
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Lubricants
Macwhyte Co.
Roebling's, John A., Sons Co.
Texas Co., The

Wire Rope Slings
American Cable Co.
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons

Wire Rope Sockets
American Cable Co.
American Hoist & Derrick Co.
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roeblings, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Thimbles
Laughlin, Thomas, Inc.
Macwhyte Co.

Wire Turnbuckles
Laughlin, Thomas, Inc.

Wiring Devices
Wetsinghouse Elec. & Mfg. Co.

Classified Advertisements

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2—4 roll Raymond High Side Mills, also 3-roll.
3—5 and 6-roll Raymond Low Side Mills.
5—Raymond beater types, Nos. 0000, 00, 1, 3, and Nos. 32, 55, 60 and 90 Imp. Mills.
1—24" No. 4 Mikro Pulverizer.
4—Sturtevant Ring Roll Mills, Nos. 0, 1, 2.
Coal Pulverizers—Raymond, Aero, Erie City, Simplex, Kennedy.
Kent Maxecon and Bradley Mills.

JAW CRUSHERS

42"x48" Traylor; 15x30, 18x36, 24x36, 30x42" Farrel; 24"x36", 36x48 Allis-Chalmers; 30x42 Buchanan.

REDUCTION GYRATORY CRUSHERS

3' Traylor; 4' Traylor No. 410-TZ; 5" Newhouse with 40 H.P. motor; Nos. 19, 25, 37, 49 Kennedy.

VIBRATING SCREENS

5—5'x10' Symons Screens, 2-deck, each with 7½ H.P. 3/60/440 volt motor.
5—4'x7' Jeffrey-Traylor FB-4, magnetic, all 2-deck. Used 30 days. With motor generator sets, panels, etc.
2—4'x8' Robins Gyrex, 2-deck.
2—3'x6' Sturtevant Moto-Vibro, 2-deck.
5—Tyler Hummers, 3'x5', 4x5, 4x7, 1 to 3 decks.

LOCOMOTIVE

16-ton Whitcomb Gasoline Locomotive, standard gauge, 6-cylinder, 6x7 motor, self-starter. 80% new. Running demonstration.

LOCOMOTIVE CRANE

25-ton capacity Ohio, 8 wheel, standard gauge, ASME boiler, double drum, 50 ft. boom.

AIR COMPRESSORS

2—No. 315 and No. 270 I.R. Portable—Oil Engine driven.
2—POC, I.R., 506 CFM., Diesel driven.
2—POC-2 I.R., 550 CFM., Diesel driven.
1—PRE-2 I.R., 1300 CFM., syn. motor.
2—WN-31 Sullivan, 1573 CFM., syn motors.

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12—10'x30' Vertical Steel Tanks, 125 tons or 15,000 gallons, at Peekskill, N. Y.
1—Blaw Knox 300 bbl. Cement Bin, electric scales, generator sets. Complete.

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9—3'x20, 4x30, 5x30, 6x40, 6x60, 8x60, 8'8"x85'.
2—5x30', 70"x35' Ruggles-Coles, double shell.
1—5x35' Indirect Heat, double shell.

ROTARY KILNS

2—6'x40' Bonnot, each complete with firing hood, spring seals and with or without rotary coolers; also 4'x30' Ruggles-Coles; 5x50' Vulcan; 5'4x33' Fuller; 6x60' Reeves; 7x100' Vulcan; 8x110' Reeves.

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4—10' Sturtevant "Whirlwind".
4—8', 10', 12', 14' Gayco.
1—30" Raymond.

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2—6'x12' Hardinge Rod Mills—direct drive.
2—6'x12' Allis-Chalmers Rod Mills, inc. motors.
1—3'x12' Hendy Tube Mill.
1—5'x36' Vulcan, 3-comp. iron lined, used 3 days.
6—Hardinge Conical Mills—4'6"x16", 5'x22", 6'x22", 8'x30".
1—6'x8' Patterson cont. Mill with air separator.
8—Pebble Mills: 4'6"x3'6", 5x4, 6x8, 7'6x5' and other sizes.
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Write for detailed illustrated circulars.

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15-16-17 PARK ROW **NEW YORK, N. Y.**

Our shops at Newark, N. J., cover eight acres.

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12-Ton Vulcan, 36" Gauge, Serial 3693 and 3658 with Hercules Engines Serial 100021-3. PRICE: $500.00 each, F. O. B. St. Louis, Mo.

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150 HP Scotch Marine Type **Boiler.** Retubed.
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48 HP **Cummins** 80, 100, 120 HP **Fairbanks Diesels.**
2 Buda 80/150 HP Power Units, Oil-Gas-Gasoline.
14x8x14" Ingersoll Rand Compressor & 100 HP motor.
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3—333 KVA **Transformers.** 1/60/2300 to 110/220 v.
All Sizes—Crushers—Shovels—Cranes—Compressors.

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1—15x36", 2—24x36" and 42x60" Farrell, 24x72" Traylor Jaw Crushers.
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Bucyrus Erie 3 and 5 yd. Diesel Elec. Draglines.
300 HP Fairbanks Morse 2300V Diesel Generator Sets.
Vibrating Screens, all makes and sizes.
Shovels, Cranes, Steam, Gasoline and Diesel.
Anything and everything for quarry operation.
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ACCESSORIES—New—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
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Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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SIX 360 HORSE-POWER UNITS
2160 HORSE-POWER

Individual Units Can Be Purchased.
Immediately Available for Re-Installation and Service.
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2—5' x 12' Rod Mills.
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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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1—150 ton 3 cpt. Blaw Knox; 1—110 ton Blaw Knox; 3—85 ton Heltzel; 1—72 Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler V-40; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron dial scale. All above with or without volume or weigh batchers.

2—Cement Plants: 1—1,200 bbl. Blaw Knox; 1—275 bbl. Johnson, portable.

BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

8—Dragscraper: 2—1 yd. Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst; 1—½ yd. Sauerman.

CONVEYORS & ELEVATORS

4—Steel frame belt conveyors: 3—Barber-Greene, 1—24"x156', 1—18"x60', 1—18"x45'; 1—National 18"x20'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

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1—Link Belt Mod. K-85 combination dragline and shovel Ser. No. 1698, gasoline power, 70' dragline boom, 2 yd. shovel front.

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—P & H Model No. 650, Serial No. 4188, 65' boom; 1¼ yd. bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe. Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

2—Northwest, Model 105, Serial Nos. 2053 & No. 1522 40' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1024, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 3069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

2—Thew, Model "0" combination shovel crane and dragline, Serial No. 2801 & No. 2687, ¾ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ¾ yd. bucket.

1—Byers Bearcat, Serial No. 3299, 30' boom, ½ yd. bucket.

DREDGE PUMPS

1—12" Morris Heavy Duty D.C. to 100 H.P. dbl. cyl. steam engine.

4—Belt Driven: 3—Morris Mang., 1—10", 1—8", 1—6"; 1—Fairbanks-Morse Woods 6".

CRUSHERS

4—Jaw Crushers; 1—12x36" Champion; 1—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9-A; 1—9x15 Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

TRACTORS AND SCRAPERS

4—13 yd. LeTourneau Type BY scrapers with Caterpillar RD8 Diesel tractors, new 1938.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2972, 30 tons cap., 75' boom, 3D. Clyde 30 HP elec. hoist & 90 HP elec. swinger, all complete. Perfect condition.

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For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher Plant with RA2P LeRoi Engine.

28' Elevator.

36 x 12' Screen.

30 Ton, 4 compartment Bin.

26' Reject Conveyor.
(Slightly used, as good as new)

NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.

NEW 11 x 20 Bronze Bearing Jaw Crusher.

NEW 24 x 36 Plain Bearing Jaw Crusher.

NEW 30 x 18 Roller Bearing Double Roll Crusher.

1—USED 5 ton per hour Day Pulverizer.

1—USED 10 to 15 ton per hour Gruendler Pulverizer.

1—NEW 10 to 15 ton per hour Pulverizer.

1—NEW 6 to 7 ton per hour Gruendler Pulverizer.

1—36 x 16' Trunnion type Revolving Screen with Dust Jacket.

CRUSHER SERVICE

Box 975 St. Louis, Missouri

For Sale: 10 Atlas all steel Rocker Dump cars, 1¼-yd. Capacity, 36" gauge, splendid condition. $75.00 each, f.o.b. our plant.

THE LAWRENCE CLAY CO.
JACKSON, OHIO

NEW AND USED PIPE FOR EVERY PURPOSE

Large stocks carried everywhere for spot shipment

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National Stock Yds. (St. Clair Co.) Ill.

JACKHAMMER DRILLS

8 Ingersoll-Rand Jackhammer Drills. PRICE: $25.00 each, F. O. B. Kansas City, Mo.

MISSOURI PORTLAND CEMENT CO.
3615 Olive St., St. Louis, Mo.

Air Compressors

1721' I-R, PRE-2, Dir.Con.Syn.Mt.2200 V.,100 lb.
1500' I-R, XR-2, Belted Ind. Mt. 2200 V., 100 lb.
1302' I-R, PRE-2, Dir.Con.Syn.Mt. 440 V., 100 lb.
1052' I-R, XCB, Belted Syn.Mt. 2200 V., 100 lb.

Synch. Motor Generators

750 KW WEST., 125/250 V.,2400 A.C.,900 RPM.
300 KW G.E.,125/250 V.,2300/4000 A.C.,1200 RPM.
300 KW G.E., 250 V., 2300/4000 A.C., 720 RPM.
200 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM.
200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM.
150 KW WEST.,250 V.,2300/4000 A.C.,1200 RPM.
100 KW G.E., 250 V., 2300 A.C., 1200 RPM.

Synchronous Converters

300 KW G.E.,250 D.C.,2300/4000 A.C.,1200 RPM.
200 KW G.E.,250 D.C.,2300/4000 A.C.,1200 RPM.
200 KW R.W.,250 D.C.,2300/4000 A.C.,1200 RPM.
150 KW R.W.,250 D.C.,2300/4000 A.C.,1200 RPM.

Each unit listed above is owned by us and is only a small part of our large stock, consisting of battery and trolley locomotives, transformers, motors, coal crushers and wheel presses.

WHAT HAVE YOU FOR SALE?

Wallace E. Kirk Company
INCORPORATED
502-F Grant Building Pittsburgh, Pa.

FOR SALE

USED EQUIPMENT

9x18 DIAMOND Roller Bearing Jaw Crusher.
10x20 DIAMOND Roller Bearing Jaw Crusher.
10x36 DIAMOND Roller Bearing Jaw Crusher.
15x36 DIAMOND Roller Bearing Jaw Crusher.
2'0"x4'0" Single Deck DIAMOND Vibrating Screen.

NEW EQUIPMENT

1—DIAMOND 9x16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 H.P. engine. Special price for quick sale.

Diamond Iron Works, Inc., and Mahr Manufacturing Company Div.
Minneapolis, Minn.

DIESEL OIL ENGINES

One 600 ft. Sullivan air compressor Direct connected to 150 Hp. Full Diesel Oil Engine. 15, 20, 40, 80, 120 Hp. Oil Engs. Air Compressors, Motors. Must move. Terms.

J. D. Anderson Machinery Co.
5516 Maple Ave., St. Louis, Mo.

CONCRETE—CEMENT—EQUIPMENT

225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
76 yds. Johnson 3 compt. bin, weigh batchers.
4 Blaw Knox circular bins, 60 tons each.
115 tons Blaw Knox 2 compartment steel bin.
2 Smith 1 yd. tilting mixers, electric. Complete.

CRUSHERS—PULVERIZERS—SCREENS—FEEDERS

Jaw: 6x12, 9x16, 10x20, 12x36, 13x30, 18x36, 24x36.
Gyratory: K.V.S. 19, 25-S, 20, 37-S, 49; Telsmith 8A; Traylor 8".
Superior McCully 13", 8", 6".
Jeffrey Type A 30" x 24" pulverizer.
Jeffrey 24" x 24" spiked roll crusher.
Robbins apron feeders, 18" x 6', 24" x 6'.
Traylor apron feeder, 5' x 15'.
Bucket elevator, 23' chain, buckets 8"x6"x12".
4' x 10' Robins Triplex, 3 decks, screen.
4' x 8' Huron screen, 3 decks, with motor drive.
3' x 6' Telsmith, 2 deck, vibrating screen.
48" x 20' Allis Chalmers revolving scalping screens, full manganese.
48" x 20' Universal revolving screen.

CRANES—SHOVELS—DRAGLINES

Whirley, 25 tons cap., 85' boom, electric.
43-B Bucyrus Erie Diesel 2 yd. shovel.
41-B Bucyrus Erie comb. crane and shovel. Steam.
Lorain Model 77 Diesel shovel, 1½ yd.
P & H Model 650 crane, 60' boom.
Northwest No. 4 crane and backhoe.
Lorain Model 40 truck crane.
Lima Model 101 crane, 1¼ yd.
Ohio 25 ton locomotive steam crane, 60' boom.

BUCKETS

Williams Hercules 1½ yd. digging clamshell. NEW.
Hayward clamshell 1½ yd. rehandling.
Owen ½ yd. Type M digging clamshell.
Blaw Knox rock grab, 3 leaf.
Owen rock grab, size No. 7S, R.A.

CONVEYING EQUIPMENT

Barber Greene conveyor, 24" x 200', complete.
8 Barber Greene conveyors, 24" x 35', type N.
New conveyor belt, special stock, 14" to 48".
Head & tail pulleys, take-ups, rollers, idlers.

MISCELLANEOUS

120 HP gas engine, clutch, tex rope pulley.
5 AC Mack dump trucks, 8½ yd. bodies. Special.
4 AB Mack dump trucks, 3½ yd.
Gas locomotives, 2½ to 35 tons.
Dredge pumps, 6", 8", 10", 12", 16".

RICHARD P. WALSH
30 CHURCH STREET, NEW YORK, N. Y.

FOR SALE

Model 70 Marion steam shovel 2½-yard bucket, workable condition.

Two 27 ton American locomotives, standard gauge.

Can be seen at Osborn, Ohio.

Wabash Portland Cement Co.
Detroit, Michigan

No. 8 CRUSHER

Allis-Chalmers size 8L Gates Crusher Serial 4715—28295 with 1¼" eccentricity complete with gear, pinion and pulley and bucket elevator belt 152' long, buckets 20"x9"x15" continuous. PRICE: $750.00 where is and as is, located at St. Louis, Mo.

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3615 Olive St., St. Louis, Mo.

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3 Kityer & Schultless Hydrators.
AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1202, 1722 & 2200 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110,160,220,310,540 & 1200 Ft.
STEAM: 40, 310, 528, 1300, 2200 & 3000 Ft.
CLAMSHELL BUCKETS, SKIPS & GRAPPLES
Owen R A & H Stone Grappies.
2 Yd. OWEN Type S Material Handling.
1½ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rack Grabs.
CRANES AND DRAGLINES
⅜ Yd. 5 Ton O & S 30 Ft. Boom.
12 Ton NORTHWEST 50 Ft. Boom Gas.
25 Ton BROWNING & 20 Ton AMERICAN Loco.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
CATERPILLAR SHOVELS
⅜ Yd. Bucyrus 10B Electric & ⅜ yd. Nisley Gas.
2 Yd. Marion Steam Shovel.
⅜ Yd.,1⅛ Yd.,2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
1½ Yd. BUCYRUS 41B Steamer.
4 Yd. Bucyrus 120B Electric. Also 3 yd. Erie Elec.
DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga.,V Shaped.
15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd.Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.
FLAT CARS
9—50 ton std. ga. heavy duty flat cars.
HOISTING ENGINES
Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 80, 100 & 150 HP.
Steam: 6¼x8, 7x10, 8¼x10, 10x12, 12x14.
DIESEL UNITS
75, 90, 180, 240 HP F. M. Engines.
110 HP Ingersoll Rand Engine.
175 KVA Worthington 3/60/2300.
275 KVA Fairbanks 3/60/2300.
BALL, ROD AND TUBE MILLS
6x8 Pebble Mill & 5x5 Batch Mill.
3'x8" & 5'x22" HARDINGE CON. Dry Ball Mill.
3'x36" HARDINGE CONICAL Wet Ball Mill.
6'x22" HARDINGE CONICAL Pebble Mill.
8'x22" HARDINGE CONICAL Ball or Pebble Mill.
4x8, 8x6 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills & 6'x22'.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.
PULVERIZERS
JEFFERY 24x20 & 1½ Sturtevant R.R.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp Mills No. 4, 32 & 55.
GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 ft.Chaser M.
STEEL STORAGE TANKS
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.
MATERIAL BIN
116 Ton Blaw Knox 2 Compt.
400 BARREL CEMENT BIN
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.
SEPARATORS AND COLLECTORS
Gayco 5 ft., 12 ft. and 14 ft. Separators.
Type 360 Sly 8x24,8x52 and 16x42 Dust Collectors.
ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers.
JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9,16x12,16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12,36x15,30x13 36x15, 36x30, 36x18, 36x14, 36x9,36x6,36x10,36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 36x16, 9x36.
CONE & GYRATORY CRUSHERS
42 in. McCully Mammoth Gyratory.
5 No. 19, 25, 37 & 49 Kennedy.
18 in.,24 in.,30 in.,36 in.and 48 in.Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory.
4—Nos. 5, 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory, also 16 inch.
8 in. Traylor T. Gyratory.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt, 1200 rpm.
150 K.W. GEN. ELEC. 3/60/2200-250-275 v., 1200 rpm.
200 K.W.RIDGWAY 3/60/2200-250-275v.,900 rpm.
SLIP RING MOTORS
52 H. P. GEN. ELEC. 3/60/440 v., 1200 rpm.
(3) 100 H.P.GEN.ELEC.3/60/440v.,900-1200 rpm.
CONVEYOR PARTS
BELT: 1000 Ft.60 In..700 Ft.40 In..600 Ft.36 In., 800 Ft.30 In.,1642 Ft.24 In.,517 Ft.20 In., 297 Ft.18 In., 500 Ft.16 In.,300 Ft.14 In.
IDLERS: 54 In.,42 In.,36 In.,30 In.,24 In.,20 In.,18 In.,16 In. & 14 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,30 In.& 36 In. Sections.
ROTARY DRYERS AND KILNS
36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x30 Ft., 54 In. x 30 Ft.,42 In.x24 Ft.,5 Ft.x30 Ft.,5 Ft.x16 Ft.,5 Ft.x60 Ft., 6 Ft.x60 Ft.,6 Ft.x20 Ft., 6 Ft.x70 Ft.
RUBBER HOSE
Air ¾ to 1½ in., Water ¾ to 10 in.
STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom,25 Ton 100 Ft.Boom,75 Ton 135 Ft.Boom.
LOCOMOTIVES
GASOLINE: 3 Ton,5 Ton,8 Ton,12,14,and 20 Ton.
STEAM: 9 Ton,20 Ton,40 Ton,60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton.
SCREENS
VIBRATING: 2x4, 3x6, 12x8, 3x8, 3x5, 4x5, 4x8, 4x10, 4ftx7ft & 4x12, 1, 2 & 3 Deck.
HUMMER, ROTEX, NIAGARA & ROBINS.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16,4x20, 4x22, 4x24, 5x20, 5x22, 6x26.
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SELECTED ITEMS FOR MINES, QUARRIES AND PITS

14" and 16" wide Belt Conveyor Equipment
18" Belt Conveyor Equip., Plain & Ball-Bearing
4—24" Gravity Take-Ups, for Conveyors
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36" Link-Belt Self-Contained Apron Feeder
12", 14", 18", 20", 30" and 36" Conveyor Belt
14" & 22" New 8-p. rub-cov. Elevator Belt
Belt, Idlers, Chain, Buckets, Pulleys, &c
10"x34' Chain Bucket Elevator, Enclosed
14"x32' Chain Bucket Elevator, Open Type
Hardinge Pebble Mill, 8-ft. x 22"
Traylor 8" Bulldog Gyratory Crusher
Telsmith No. 30 Rotary Grizzly
Robins Corrugated Crushing Rolls, 28" x 30"
2½" Centrif. Pump, 20-hp. Motor, 250-g. 156'
50-hp. 8lip Ring Motor, 3-60-220-1800
660' Worthington 2-stage Belted Compressor
176' Chicago N8B 9x8 Air Compressor
½-yard and 1-yard Drag Line Buckets
Cletrac No. 40 Tractor, 40-hp. motor. On Cats
Vibrating Screens
3x5' Multirap 1-deck, Wet or Dry Screening
2—3x5 Hummers 1-deck, V16 Vibrator Heads
2—3x5 Hummers 2-deck, V16 Vibrator Heads
3x6' Plat-O 1-deck, with V-Belt Drive
3x6' Leahy 2-deck, with Direct Motor Drive
2—4x5 Hummers 2-deck, V16 Vibrator Heads
4x5' Hummer 2-deck, V40 Vibrator Heads
3—4x8 Robins 2-deck, Gyrex types
Robins 4' x 8' Balanced Perfex Shaking Screens

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CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 36" Allis-C. 20" Super. McCully conv. to 16". Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.
JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72, Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x30, 8x24, 12x24, 9x36, 9x30, 15x36.
REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.
ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16. Etc., Etc.
HAMMERMILLS: Williams No. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6'x3', 5'x30" & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.
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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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Transmission • Conveyor • Elevator
"V" BELTS
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LOW PRICES

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Available due to plant revision. Price $3500.00 complete. 15-Ton McMyler—65-ft boom, 16' dia. Bull Wheel. 2-Drum hoist direct geared to Westinghouse 300 h.p., 440 V., 3 Ph., 60 Cy. motor 388 r.p.m. Magnetic brakes. Hoist speed 400' per min. Rope speed 267' per min. Complete with controls and single drum swing hoist direct driven by 50 h.p. Westinghouse motor 850 r.p.m. Rope speed 67' per min. 3-yard Hayward bucket and 250'—1" hoist cable and 500'—⅞" boom line. Located at Memphis, Tennessee.

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3615 Olive St., St. Louis, Mo.

BINS: Bulk Cement Bin, 223 Bbl. capacity; also one 55 ton, 2 compartment Material Bin, all steel.

BULK CEMENT UNLOADER: Fuller Kinyon, portable, self-propelled, with built-in motor, 40 H.P.—A.C., complete.

BUCKETS: Blaw Knox 2 yd. and 3 yd. capacity Clam Shell; one Hayward 3 yd. capacity Orange Peel.

CARS: Six Clark 30 yd. capacity, standard gauge, all steel, 2-way air dump cars, apron type doors; Six Kopple 12 yd., all steel, standard gauge, hand dump cars; ten 50 ton, all steel, hopper bottom gondola cars.

BOILERS: 100 H.P. Farquhar, locomotive type, on skids, National Board, 125 lbs. pressure; also one 40 H.P. Locomotive type, 190 lbs. pressure.

COMPRESSORS: One Ingersoll-Rand 320 cu. ft. portable, gas, on steel wheels.

CRUSHER SPECIALS: Two 24 x 36; one 13 x 30, Jaw Crushers. One Kennedy 25 Reduction Crusher, with 50 H.P. vertical motor, V-belt drive. One Allis-Chalmers 12"; and one 20" Superior McCully Gyratory crushers.

CRUSHER ROLLS: Two 16 x 36; one 16 x 42; one 24 x 54.

BELT CONVEYOR: One 36" x 200'.

DIESEL ENGINE: One 450 H.P. Cooper-Bessemer, 4 cylinder, 4 cycle, solid injection, 225 R.P.M., with or without 300 K.W.—A.C. Generator, 2300 volt, complete with all auxiliary equipment.

DREDGE PUMPS: One Morris 6" with 5 H.P., A.C. 220 volt, variable speed motor; also one Morris 10" Belt Drive.

DRILL SHARPENER: Ingersoll Rand size 50, with dies and dollies for hollow, round and Hex steel.

DRYER: One Ruggles Cole double shell, 8'6" x 86'.

HOIST: Sullivan double drum, 50 H.P. electric, for sluicing and drag scraper work; one National 3 drum with swinger attached, with or without 65 H.P. Buda motor.

LOCOMOTIVES: Gasoline, 14 ton Whitcomb, 36" gauge; also one 25 ton Vulcan, standard gauge.

KILNS: Two 7'6" x 100' and two 6' x 100'.

MAGNETIC PULLEY: 24" Dia., 48" Belt.

PUMP: One Fairbanks-Morse centrifugal, direct connected to 40 H.P. A.C. motor, capacity 1200 G.P.M. at 90' head.

PULVERIZERS: One Sturtevant No. 1 Ring Roll Mill. One Raymond Five Roller High Side Mill.

SCREENS: 3 x 6; and 3 x 8, double deck Vibrator V-belt drive; one 60" x 20', revolving screen for scalping or scrubbing, with one section blind; also two 48" x 24' sizing screens, with 7' diameter outerjacket. One—Link Belt 3 x 6, single deck, heavy duty.

SLACKLINES: Sauerman, 75 H.P. electric, 90' mast, ¾ yd. bucket, cables, etc.

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TRACK: 600 ft. of 24" gauge, portable track, with switches and fifteen 1 yd. capacity all steel cars.

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Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

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goes where business is good. In times like the present when the construction industry is showing the greatest activity in years you can depend on ROCK PRODUCTS to deliver your sales message to the real buying power among the producers of the raw materials. Lisit your used machinery items here every month and keep in touch with the men who control 92% of the buying.

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All Sizes - Types - Makes
Conveying Equipment
SAVE 60% OF NEW COSTS
All Materials Overhauled, Guaranteed
SEND FOR OUR STOCK LISTS
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Good Used Koppel Air Dump Cars Steel Bodies

All Reconditioned Our Works
13 cars 20 cu. yd.—40 tons Cap. Lifting Sides
3 cars 20 cu. yd.—40 tons Cap. Drop Sides
Location—Pittsburgh District
Prices—Exceptionally Attractive

Pressed Steel Car Co., Inc.
(Koppel Division)
330 GRANT ST. PITTSBURGH, PA.

FOR SALE

45 Ton Plymouth gas-electric locomotive, type 0-4-4-0, standard gauge.
30 Ton Whitcomb locomotive, type 0-4-0, standard gauge.
22 Ton Plymouth gasoline locomotive, type 0-4-0, standard gauge.
16 Ton Milwaukee gasoline locomotive, type 0-4-0, standard gauge.
8 Ton Plymouth gasoline locomotive, type 0-4-0, standard gauge.
35 Ton McMyler eight wheel steam locomotive crane, 70′ boom.
21 Ton Vulcan four wheel saddle tank locomotive, 36″ gauge, National Board boiler.
5-Yard Western two way side dump cars, steel underframe, heavy duty, 36″ gauge.

Complete stock list on request

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALABAMA

SACRIFICE

Diesel-Electric Dragline, 3½-4 yd., 100-115′ boom. First class condition and complete. Can be used as crane—capacity 10 tons at 115′ radius. Rail or water shipment. Best offer takes it.

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2—10 inch Steel Portable Dredges
1—15 inch Steel Portable Dredge

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Used Equipment Wanted

WILL PAY CASH FOR GOOD:

(1) Lime Hydrating Outfit.
Rotary Kilns and Dryers.
Hammermills, Pulverizers and Rolls.
Ball, Rod and Tube Mills.
Air Compressors: Diesel, Btd., Elec. & Steam.
Crushers: Jaw—Gyratory and Cone.

TIDEWATER EQUIPT. & MACHY. CORP.
101 West 31st Street NEW YORK, N. Y.

GOOD USED SAND & GRAVEL EQUIPMENT

2½ or 3 yard Slackline Cableway
30 x 42 Jaw Crusher
150 Tons per hour 1½ under reduction Crusher
3 Double Deck Vibrator Screens
36″ x 24″ Conveyors
1500 Gal. Pump 125′ Head and Pipe
Large Portable Bins
Give price and complete specifications

Box 899, Care Rock Products, 205 West Wacker Drive, Chicago.

WANTED

1—eight yard capacity Crescent bucket in good condition, complete with hanger if possible. Advise by air mail, **Box 898, care of Rock Products, 205 West Wacker Drive, Chicago, Ill.**

WANTED

USED PORTABLE BELT CONVEYORS, AND SCREW CONVEYORS.

COLUMBIA QUARRY CO.
ST. LOUIS, MISSOURI

Concrete Products Equipment For Sale

FOR SALE

Used Stearns Power Block Machine, Anchor 8 Bar Tamper, Anchor Jr. Stripper with Attachments and Pallets. Also Electric Truck, Conveyor, Vibrating Table, Pallet Oilers, Bucket Drags and Stokers.

PYRAMID BLOCK COMPANY
National at 67th St., West Allis, Wis.

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BUSINESS FOR SALE

The Norwalk Mold Company, an Ohio Corporation, in business since 1912, selling Molds and Territorial Rights for manufacture of Concrete Burial Vaults. Includes Patterns, Office Fixtures and Files.

For Further Details and Prices Write

THE NORWALK MOLD COMPANY
Norwalk, Ohio

FOR SALE

Up to 5000 Acres of Tennessee PHOSPHATE LANDS
Mineral Rights or Fee Simple
BEST AND SAFEST PLACE TO INVEST IDLE MONEY
H. D. Ruhm Columbia, Tenn.

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DRAFTSMAN EXPERIENCED IN DESIGNING crushing and metallurgical machinery. State qualifications and salary expected. Replies will be held in strictest confidence. Address Box 891, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

SALES ENGINEER EXPERIENCED IN selling crushing and cement machinery. State qualifications and salary expected. Replies will be held in strictest confidence. Address Box 887, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

Positions Wanted

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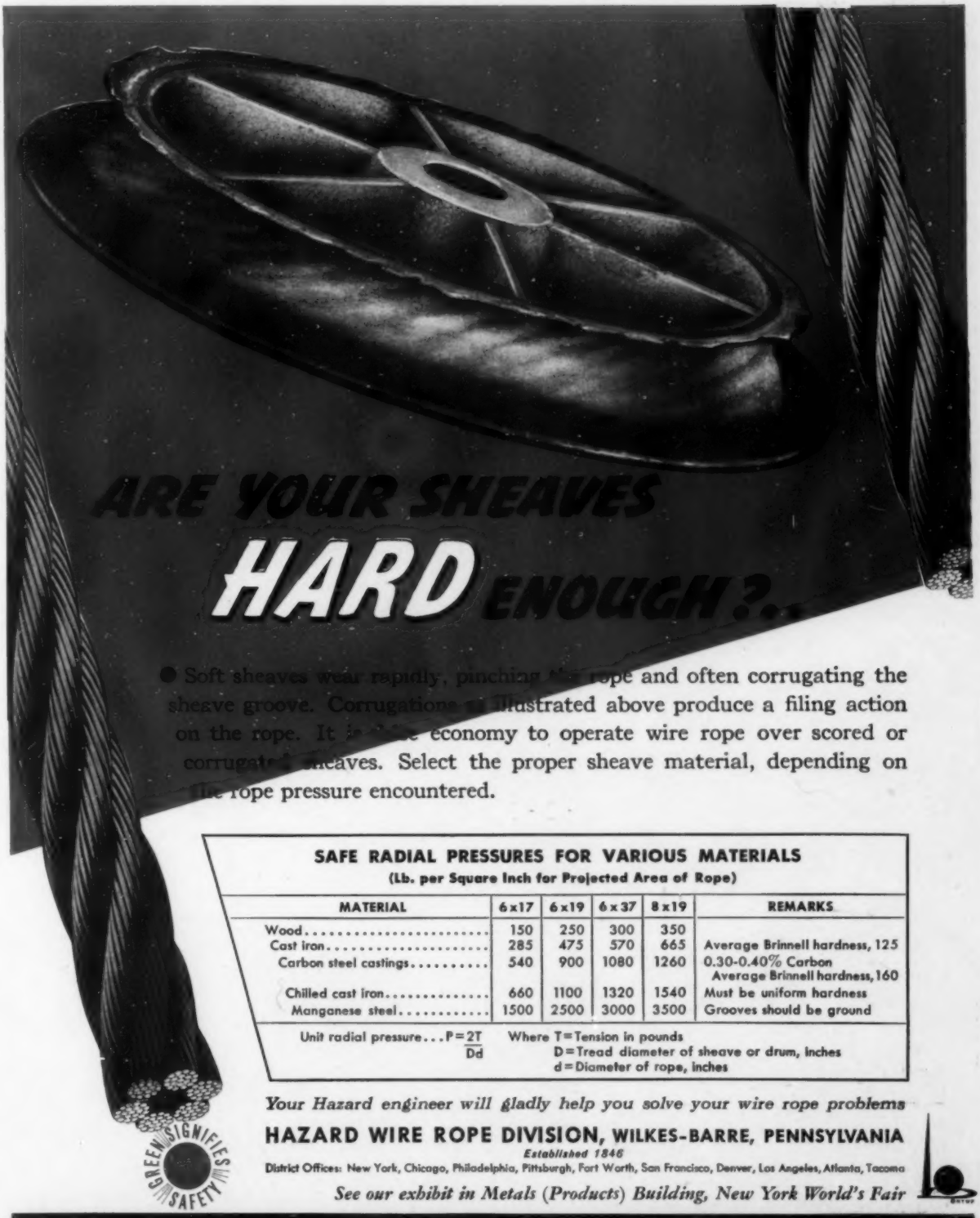
39-26



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● Soft sheaves wear rapidly, pinching the rope and often corrugating the sheave groove. Corrugations as illustrated above produce a filing action on the rope. It is false economy to operate wire rope over scored or corrugated sheaves. Select the proper sheave material, depending on the rope pressure encountered.

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(Lb. per Square Inch for Projected Area of Rope)

MATERIAL	6x17	6x19	6x37	8x19	REMARKS
Wood	150	250	300	350	
Cast iron	285	475	570	665	Average Brinnell hardness, 125
Carbon steel castings	540	900	1080	1260	0.30-0.40% Carbon Average Brinnell hardness, 160
Chilled cast iron	660	1100	1320	1540	Must be uniform hardness
Manganese steel	1500	2500	3000	3500	Grooves should be ground

Unit radial pressure... $P = \frac{2T}{Dd}$ Where T = Tension in pounds
D = Tread diameter of sheave or drum, inches
d = Diameter of rope, inches

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